

The Australasian **MANUFACTURER** SERVING ALL INDUSTRY

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Sydney, as a
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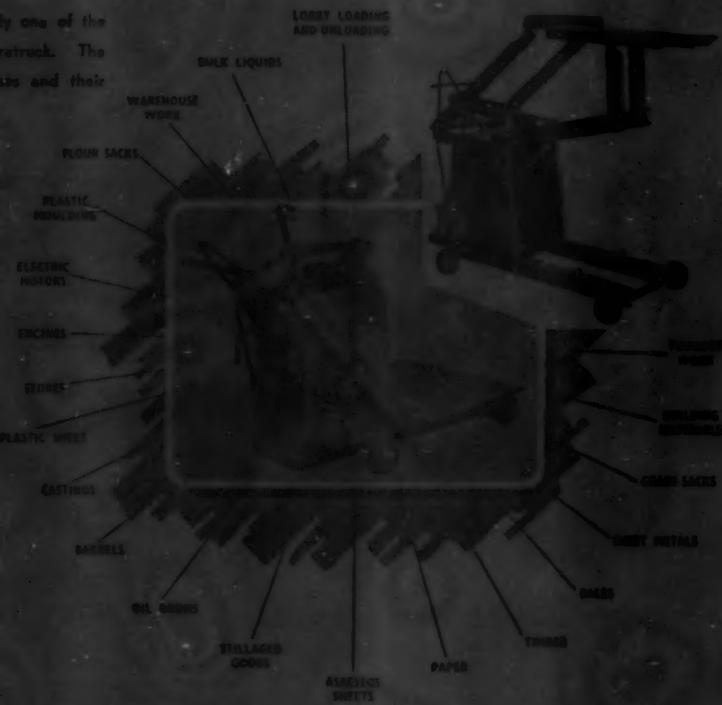
Sydney, May 20, 1950.

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AFTER BUSINESS HOURS

What Next?

PUFF away, my hearties, and disappear underground in a cloud of smoke. We are informed that any of the following symptoms can be traced to over-smoking: Giddiness, irregular pulse, heart pains, morning headache, deafness, buzzing in the ear, sneezing, sleeplessness, early waking fears or anguish, melancholia, lapses of memory and concentration, impaired taste, smell, and vision, "flickering" blots before the eyes, "colour confusion," partial impotence, paralysia of third and fourth finger, trembling, twitching, hic-

coughs and writer's cramp. No mention of ingrowing toenails, you'll notice.

A N English minister of religion was presented with a bottle of cherry brandy by one of his parishioners. He acknowledged the gift in the Church Magazine with the words "I should like to thank the donor for his gift of fruit and the spirit in which it was given."

THE Russians are said to be cutting corners in textile production by growing colour into

their cotton. At the State cotton farm at Tashkent, more than 750,000 acres of coloured cotton is now under cultivation. It is claimed that the technicolourski cottontski has the additional advantage that garments made from it will not fade. Once a red, always a red, in other words. Or it will be when they get around to it. The only colours so far produced are green, green-brown and grey-brown.

cough. That stuff would have cured anything. *

MANAGUA (Nicaragua) got its first traffic lights a few weeks ago. Citizens agree that they don't slow the traffic down too much and are probably there to stay. One snag was that ox carts starting to cross on the green signal didn't always make it before the lights turned red. Solution: ox carts are now banned in the main street. In Washington, D.C., where traffic should be a little less chaotic, a motorist was charged with ignoring eight stop signs. Police dropped the charges against him when he proved that he had been driving in the wrong direction on a one-way street and therefore couldn't see the signs.

THE newly revised edition of *Hymns, Ancient and Modern*, published last month, has dropped 328 hymns, including *The Voice That Breathed O'er Eden*, and has picked up 167 new ones. Minor editions included the democratic elimination of the third stanza of *All Things Bright and Beautiful*:

"The rich man in his castle
The poor man at his gate,
God made them high or lowly
And ordered their estate."

YOU'D better drop that idea of tit for tat and all that. In the United States a man who had been kept awake by his neighbour's dogs was fined ten dollars for sitting on his back porch at night howling back at them.

ON learning that her marriage to him was not legal, a woman sued a Californian businessman for \$25,000 in back pay for eight years' service as secretary, bookkeeper and housekeeper.

SHAGGY MAN STORY. George Kauf, of Milwaukee, up before the Court on a charge of drunkenness, was asked why he had been riding on a tram early on Tuesday without any pants. He explained that he thought it was Monday.

GOOD stories are worth repeating—after a decent interval. You've heard these before, but it's time they came up for appreciation again:

A Scottish minister went into a barber's shop to get shaved. The barber was addicted to the use of whisky, and his hand that

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day shook so much that a gash was made in the minister's cheek. "Ah, Dougal MacMac," cried the minister, "it's a terrible thing, that whisky." To which the barber replied: "Aye, sir, it mak's the skin awfu'" tender."

The boss was reprimanding the office boy for coming in late. "This is too much," he stormed, "you should have been here at eight-thirty." "Why," asked the boy, innocently, "what happened?"

Judge: "What is the meaning of this expression 'Sex you'?"

Counsel: "M'lud, it would appear that it is a slang phrase of American origin which, regrettably, has gained currency in the language of our people through the insidious agency of the cinema, and is, I am given to understand, employed to indicate a state of dubiety in the mind of the speaker as to the veracity

or credibility of a statement made to him."

Judge: "Oh, yeah!"

OLYMPIC TYRE FACTORY FOR QUEENSLAND.

Expansion of activities of the Olympic Tyre Company in Queensland has been announced by the Chairman and Managing Director (Sir Frank Beaupre).

The company has purchased a large area of land from the Commonwealth at Geebung, near Brisbane, and construction of a new factory has already commenced.

Orders for main items of plant have been placed with leading Australian engineering firms. It will be recalled that when the Olympic Tyre Company entered the tyre manufacturing field in 1933, this 100% Australian indus-

try ordered most of its plant from Australian engineering firms, thus giving a lead to the local manufacture of this type of plant.

It is expected that the Geebung plant will eventually employ 500 to 600 people. Tyres and tubes for tractors and earth-moving equipment will be prominent in the production at the new factory.

The Chairman has expressed his appreciation of the assistance and support of the Honourable E. M. Hanlon, Premier of Queensland, and Alderman J. B. Chandler, Lord Mayor of Brisbane, in the various negotiations associated with the project. It is envisaged that the Geebung project will be a valuable contribution to the industrial future of Queensland, to decentralisation of industry, and to the provision of equipment vital to national development.

FINANCE FOR INDUSTRY.

Charterhouse (Australia) Pty. Ltd., local offshoot of the Charterhouse financial group of England, recently increased its capital from £50,000 to £500,000. Outlining future developments, the managing director, Mr. J. G. Vaughan, said that his company is about to undertake permanent capital investment within the Commonwealth. "Emphasis," he said, "will be placed on providing finance for private companies. My firm is not out to control companies or buy up businesses complete. It is only prepared to finance existing undertakings that have sound management... It will service industry by canalising money to where it is most required for Australian development. Immediate spectacular results are neither sought nor expected."

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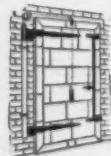
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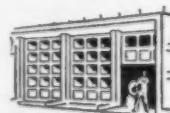
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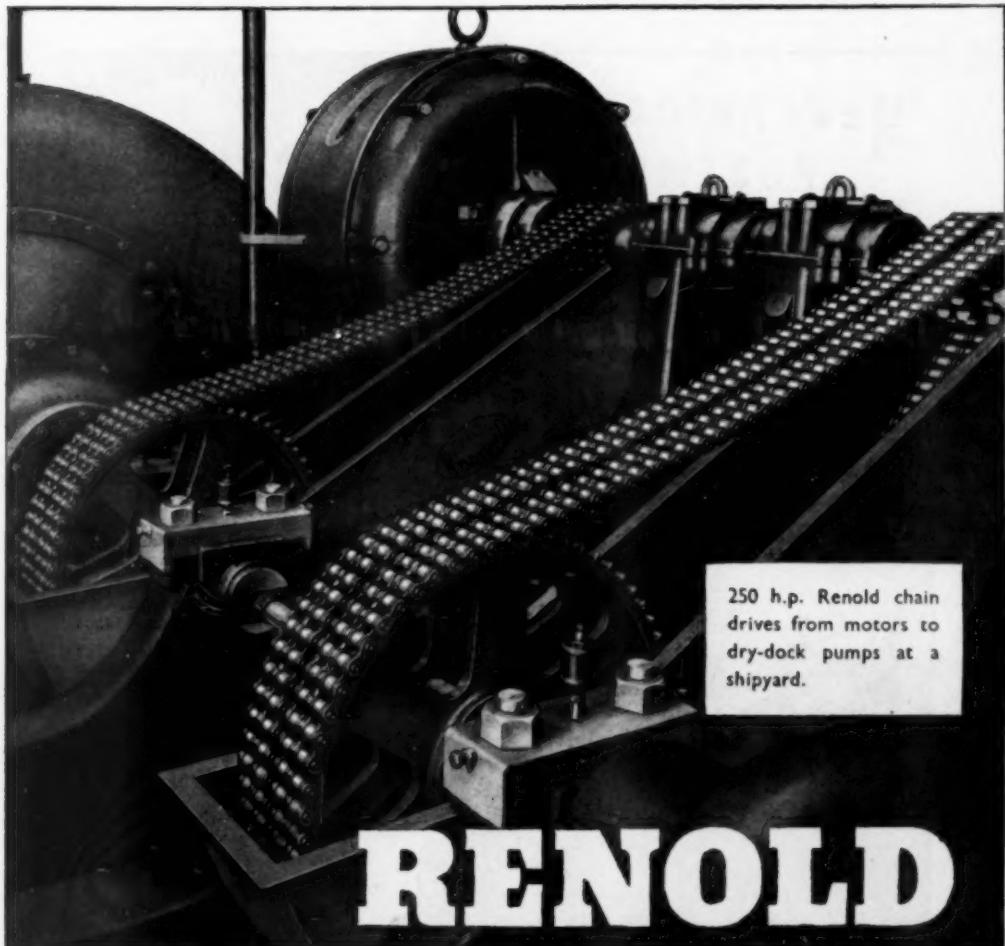


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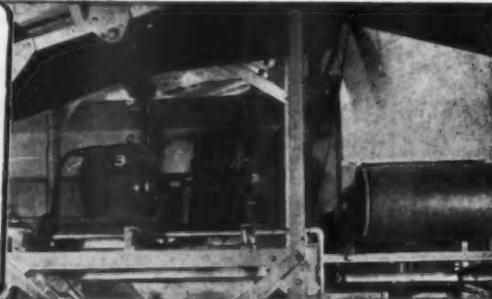
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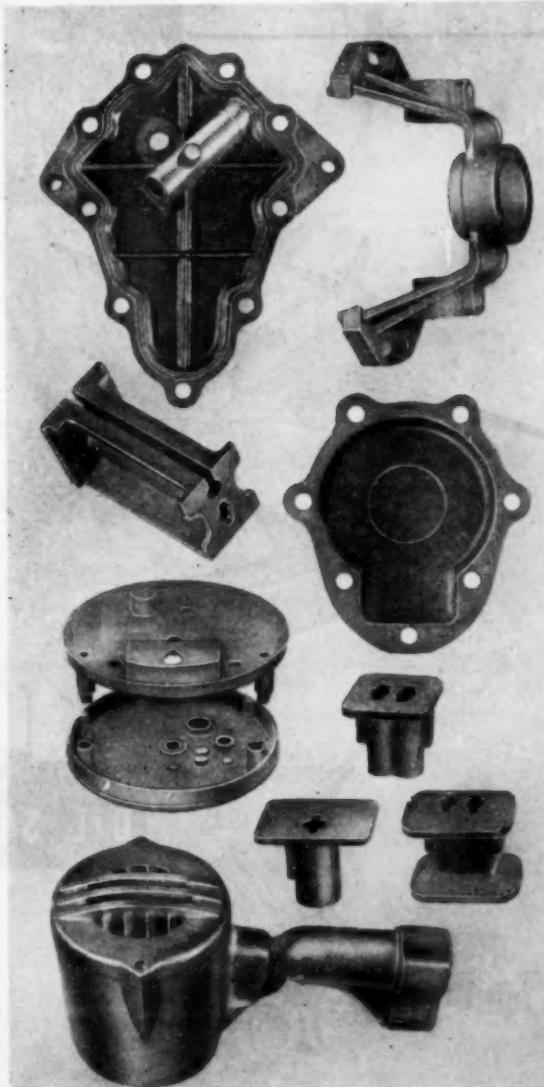
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[Page 14, May 20, 1950.]

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Australia's National Manufacturers' Newspaper circulating in all States, New Zealand and Overseas. A weekly newspaper devoted to industrial efficiency and the manufacturing progress of Australia. Subscriptions within Australia and New Zealand (including Annual Number), £1/10/-; Great Britain and Possessions, £2; Foreign, £2/10/-.
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PAGE FIFTEEN MAY 20, 1950.

Australia's Arbitration System Its Benefits and Its Responsibilities

"It cannot be regarded as being in the public interest that one party to an industrial dispute should be required to answer a claim before an arbitration authority when the other party—the party pursuing the claim—is flouting an arbitration award of the same authority and is . . . seeking to enforce an industrial claim by direct action. I hold that action, which is clearly inequitable and unconscionable, must always be against the public interest."—The Chief Judge, Mr. Justice Kelly, in the Federal Arbitration Court during the past week.

THIS statement was made by Mr. Justice Kelly when the Full Bench of the Arbitration Court dismissed from the basic wage hearing six metal trade unions because their members have imposed overtime bans in order to enforce demands for wage increases. The unions are: Amalgamated Engineering Union; Australasian Society of Engineers; Blacksmiths' Society; Sheet Metal Workers' Union; and the Federated Ironworkers' Association.

The application for dismissal was made to the Court by the Metal Trades Employers' Association, and will affect directly upwards of 250,000 workers throughout Australia employed by some 10,000 employers. The ruling means that no representatives of these unions can now appear before the Court and address it on the basic wage claim which commenced some fourteen months ago. The ultimate decision of the Court on the claim, moreover, will apply to these unions only if they can show that they have abided by arbitration and have lifted any bans now imposed.

This, unquestionably, is a momentous decision and is destined to have far-flung consequences throughout the Australian industrial world. It is a just, an equitable, and a timely decision. For none can dispute the justice of both parties before the Court being obliged to obey its awards. None can question the equity of both parties being bound equally by its decisions. And certainly none can deny that the time is more than due for an insistence by the Court that it shall be realised fully that its judgments spell responsibilities as well as benefits, the one, indeed, being directly proportionate to the other.

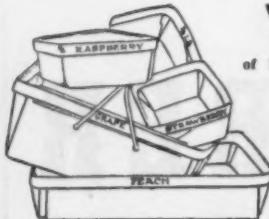
This aspect of arbitration was summarised admirably by the Chief Judge when he declared: "There is an obligation, always existing upon organisations registered under the Act, to accept awards made by Arbitration authorities. Organisations must recognise this obligation as the quid pro quo for the benefits they derive from registration. This obliga-

tion is not fulfilled by the mere passage of resolutions directing members to comply. The responsibility of an organisation in this connection does not cease, even with threats of expulsion or discipline. The responsibility lies upon it, if its rules be inadequate, to arm itself with rules that will enable it to maintain complete control of and against recalcitrant members."

There is no ambiguity there. Indeed, nothing could be clearer, more concise and more to the point. As a matter of fact, as Mr. Justice Kelly went on to point out, one of the main concerns of a union registered under the Act is to defend its existence as a registered organisation with the right to participate in the benefits conferred by the Act from the subversive indiscipline of members who themselves ignore or repudiate the obligations of their membership.

The Metal Trades Employers' Association, it will be recalled, asked the Court in April last to strike out the claims for an increased basic wage by the six unions because they were participating in overtime bans on twelve companies in order to enforce their claims. The bans, by the way, were imposed on January 13th last and are still operative. The claims included wage increases ranging from 5/- to 20/- per week and a ban on the employment of new labour by the establishments concerned. Dealing with these two points, Mr. Justice Dunphy, in his judgment, declared: "The bans on overtime are clearly illegal, but the ban on the employment of new labour is an even more inequitable factor. I think the whole community is prepared to concede that unions have industrial strength and are entitled to such strength, but in this instance there has been, in my opinion, no valid attempt to use its strength in the right direction."

The employers indubitably have law and justice on their side. For when the 40-hour week award was made, was it not laid down by the Court that the working of "reasonable overtime" was a condition of that award? At no stage in the Court proceedings has it even been suggested



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that the twelve engineering establishments asked for an unreasonable amount of overtime or that any employee was forced to work overtime without his consent. The Court, moreover, has been extremely patient throughout—indeed, some may be pardoned for thinking even too patient—having abandoned hearing of the employers' application on no less than three separate occasions in order to enable union officials to persuade their members to remove the ban.

The shame and the blame of it, therefore, rest on the shoulders of the unionists and on the shoulders of the unionists only.

The manufacturers of Australia have reason to be gratified at the

stand taken by the Full Bench of the Federal Arbitration Court. It is a stand which will be backed by the overwhelming majority of thinking, patriotic Australians. For this nation's arbitration system is too noble and too useful an institution to suffer sabotage at the hands of the militant few.

No individual, and no group of individuals, can, under any circumstances, be permitted to participate in and enjoy the manifold benefits of the arbitration system without, at the same time, abiding by its decisions, honoring its awards, and accepting wholeheartedly the responsibilities which are the corollaries of its benefits.

Pithy Jottings of Industry and Industrialists

APPOINTMENTS—NOYES

BROS. (SYDNEY) LTD.

Mr. T. Malcolm Ritchie, previously managing director, has been appointed chairman of directors of Noyes Bros. (Sydney) Ltd., in succession to the late Mr. E. R. Mitchell. Mr. E. A. Coghlan has been appointed a director, and Messrs. J. A. Bull, J. H. McDonald, and W. J. Wilson alternates to the company's English directors.

SIMMONDS' AEROCESSORIES.

Simmonds Aerocessories Ltd., of Trefores, Glamorgan, London and Birmingham, are rapidly expanding their sales representation both at home and overseas. The increasing demand for their well-known products—Self Locking Nuts (including a new Nyloc ver-

sion), Fram Oil Cleaners, Spire Speed Nuts and Liquid Contents Gauges, has resulted in the doubling of their technical sales forces. Production has been proportionately increased under the direction of Mr. L. G. Oxford, who has been appointed Joint Managing Director, and Mr. C. J. Turner, Works Manager. Mr. E. S. Mead has become General Sales Manager of their five sales' divisions.

U.K. AND U.S. PRODUCTION METHODS.

A team of British blast-furnace workers who recently made an inspection tour of American blast-furnace plants, has expressed the opinion that one reason why United States production is higher than British is

that U.S. works managers can do any job their workers can do. They summarised the results of their investigations as under:—(1) At some forges in the United States output is four times as high as in Britain. (2) American managers are much more familiar with problems of production than is often found in Britain. (3) Because of this the American managers usually command high respect from the manual workers.

Their report adds: 'We saw an American hammerman who makes £45 a week for 45 hours' work, on piecework. Yet the price per piece he receives is only about one-half what his opposite number in Britain receives. The American scores because of mechanical handling and because of good timekeeping. All workers strive for the highest output because they like the extra money and fear the sack if they do not reach an acceptable standard. And when they get the money they can buy things with it. But in Britain the purchasing power of money is limited by shortages, high prices, purchase tax, and high income taxes.'

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NEW TARIFF BOARD MEMBER.

Mr. F. W. Higgins, the Director of the Australian Industries Protection League, Melbourne, is the new member of the Commonwealth Tariff Board. The Minister for Trade and Customs (Senator O'Sullivan) announced this last week. Mr. Higgins, 55, was once an officer of the Trade and Customs Department.

ENGLISH MANUFACTURERS BUYING BUILDING SITES.

Joseph Lucas (Aust.) Pty. Ltd., the Australian subsidiary of Joseph Lucas Ltd., the £21 million English electrical engineers, has plans for further expansion in Australia. It recently paid cluding two brick cottages, on the Nepean Highway, S.W. corner of Bay Road, Cheltenham, Melbourne.

Another off-shoot, the Austral Battery Co. Pty. Ltd., has been

RONALDSON TIPPETT EXECUTIVES GOING ABROAD.

Mr. E. J. Tippett, a director and works manager of the Ballarat engineering firm, Ronaldson Bros. and Tippett Ltd., will leave on May 23 for a six months' business trip abroad. About two and a half months will be spent in America, where Mr. Tippett will be accompanied by one of the firm's engineers, Mr. J. Eggleton.

"MANUFACTURER" INDEX

The index covering all issues of "The Australian Manufacturer" from April 1, 1949, to March 31, 1950, is just off the press. It has been compiled for use in libraries and for such industrial undertakings as regularly keep the journal on file. It constitutes a speedy and accurate means of locating articles which have appeared as Editorials, "Around and About the Trade," in "Industrial Equipment News," in "After Business Hours," and in the general section. Will subscribers requiring copies please make early application. They will be despatched immediately on request.

making batteries here for some time.

An English firm has bought 15-17 Thomas Place, Prahran—a modern two storey brick factory of 12,000 square feet. Price was £30,000.

Coburg (Vic.) land was chosen by two English firms who intend producing in Australia. The site is 30 acres on Charles Street, costing £22,000.

• • •
MAN BITES DOG.

In shops and factories the length and breadth of Australia, the "arresting" trademark of "P.C. 49" has become a familiar figure. The issue, however, of the Car Registration Number P.C. 49 to Mr. G. Ormiston, Managing Director of Ormiston Rubber Co. Pty. Ltd., must surely enter the man-bites-dog field of news!



"P.C. 49", the trade mark of the Ormiston Rubber Co. Pty. Ltd., is the car registration number of the Managing Director of the Company, Mr. G. Ormiston.

Originating as the 49th and successful experiment by the research staff of Ormiston Rubber Co. Pty. Ltd. to discover an all-purpose elastic cement of high tensile strength, "P.C. 49" (known to many as Perfection Cement), is finding an ever-widening circle of users throughout government departments and private enterprises, as well as by individual members of the public for home repairs.

• • •
RETIREMENT OF BERGER'S S.A. MANAGER.

Mr. C. M. Taylor has retired from the position of manager of Lewis Berger & Sons (S.A.) Pty. Ltd., and is scheduled to leave with Mrs. Taylor in the Himalaya on June 9 to visit England.

Mr. Taylor has been manager of Bergers in S.A. for 19½ years, and had served with the company in other positions for 14½ years, making a total of 34 years' service. He originally joined the staff as assistant accountant, having previously been associated with mining and manufacturing businesses.

During the recent years of Mr. Taylor's control, he has shared in the general planning and oversight of Berger's South Australian factory. He is well-known to a great majority of the paint trade community in S.A.

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Viewing
Industrial
Developments

Around & About the FACTORY

A digest of new factory and plant construction, additions, alterations and improvements, and operating news of Australian industry.

Kerry Drilling Machines

The National Cash Register Company Ltd. have an extremely modern and extensive plant in Dundee, Scotland, for the manufacture of their products, which, in addition to their well-known cash registers, include accounting and adding machines.

engineering Company Ltd., Grange Road, Leyton, London, E.10, who have supplied more than 5000 similar drilling machines to customers in all parts of the world.

Twenty-three of the machines used by the National Cash Register Company are line production



A battery of Kerry Drilling Machines.

It is axiomatic that machines of this type must operate with one hundred per cent. accuracy and efficiency; and this accuracy and efficiency are dependent in no small measure upon the machines used to manufacture them.

Included in these are fifty Kerry-Super eight-speed drilling machines, supplied by Kerry's (Engl-

models, and twenty-seven are bench models.

The machines are not used for any specific type of work at the Dundee factory. They have a "maid of all work" application, Kerry machines having gained a first-rate reputation for versatility. Further details will be supplied by the makers.

Factory Bookkeeping

Planning for Expansion

It is a common sight to see factories being laid out or reconstructed so that precision machinery is correctly positioned in regard to exits and entrances to ensure the continuous flow of work through the factory. Everywhere new and improved machines are being installed and the latest techniques adopted for smooth production and economic handling of operations.

In too many of these selfsame factories and workshops, however, we find out-dated bookkeeping methods which lose hundreds of man-hours a year—a matter of some concern now, when efficient office staff are at such a premium.

With new factories, in particular, it is of greatest importance to instal a satisfactory set of books right at the outset, which are cap-

able of dealing with quickly expanding accounts, and the first problem to be confronted is the choice between bound and loose leaf ledgers.

John Withers & Son Pty. Limited, of Melbourne, a varying number of sheets can be bound or unbound with equal facility; added to or decreased as desired; arranged in



Steel Back Utility Ledger.

In the bound book, a fixed number of sheets is bound permanently and in an unalterable manner, so that time must be spent when opening a new ledger to allocate space for each account. Even with the utmost care such allocation is a matter of "guesswork," especially in a new business, and if it is found that the original method of arrangement is unsatisfactory the inconvenience must be put up with or the book discarded.

In posting to a bound book continual reference to the index is necessary, and closed and inactive accounts add to the difficulty of finding the account. The clerk making out monthly statements or taking out balances must work laboriously through the whole book, including in the survey all the closed and inactive accounts and all the pages of dead matter.

With a bound ledger, all accounts—those which are paid promptly and those which are not—must remain in the order in which they are opened. Bound books frequently heavy and unwieldy in size, must continue to hold all accounts, because those which are closed or inactive cannot be removed. This often means the purchase of new books, although the old ones are not filled.

On the other hand, a loose-leaf book such as the "Silver King" Endlock Sectional Post Binder or others in the range stocked by either permanent or changeable

order—and all this without any risk of loss or destruction of sheets.

Time is saved and "guesswork" abolished because only one sheet is allotted to each account, while the loose-leaf book automatically expands, adapting itself to business growth. Further, when a book be-



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comes too bulky it is easily divided into two volumes without in any way disturbing the order of accounts.

In addition, the sheets—originally arranged in alphabetical order—can be re-arranged numerically, geographically, or, for instance, in order of travellers' journeys, without any re-writing.

With the loose-leaf book an index is not necessary at the front of the ledger, as accounts are placed in index order and an account can be found and the entry made in the same time as it takes to find the name and folio in the index of a bound book. An index may, however, be "run through" the sheets for easier reference.

While there is no limit to the capacity of the "Silver King" End-lock Sectional Binder, common sense places it at about five inches in depth. When a larger book is required the Steel Back Utility Ledger is available. The ready interchangeability of sheets permits accounts to be transferred to this ledger, when the "Silver King" Binder may be used for storage of "dead" sheets. Cheaper Sectional Post Storage Binders are also available for this purpose.

A full range of binders and specific details are available on application to John Withers & Son Pty. Limited, 210 Queen Street, Melbourne.

"QC" Non-Electric Magnetic Pulleys

Products of Permanent Magnets Pty. Ltd.

Throughout the whole gamut of production, the entry of any foreign body into an article in process of manufacture may well mean, not only the irreparable loss of the individual product, but also grave loss to the entire undertaking.

For instance, the entrance of tramp iron, such as old nails, pieces of wire, or hammer heads into a product which ultimately has to be crushed, milled, or ground, inevitably would cause serious damage to costly and difficult-to-replace machines, followed by serious losses in production.

An effective method of overcoming this difficulty has, for years, engaged the attention of engineers. Plan after plan was devised and tested, new and better ways of overcoming the trouble were sought.

Eventually there was evolved the magnetic pulley separator, the separator by whose aid all unwanted iron is removed from feed streams.

Operation is along the following lines. The material in which the tramp iron is contained passes over a belt conveyor, the head pulley of which creates a powerful magnetic field. Material which is non-magnetic passes over the pulley and falls into the delivery chute. Such magnetic materials as are contained in the product, on the contrary, are caught and held to the belt by magnetic forces as they approach and pass over the pulley. Here they are held firmly and ultimately are carried to the underside of the moving belt beyond the range of the magnetic field. Here the iron drops into a waste bin beyond the divider.

The coming on to the market of the "QC" permanent magnetic pulley put an end, it is claimed by the makers, to the difficulties and troubles which had been associated with the magnetic pulleys of the past. For the newer type spelt the elimination of the accessory equipment which previously had been necessary—the motor generators, the rectifiers, the control gear, the slip rings,

and the wiring—all of which meant both considerable outlay and much worry.

The permanent magnet pulley has literally ushered in a new day. This is because the magnetic field in these pulleys is created by magnets made from the relatively new "Alnico" magnet alloys, alloys which are as much as twenty times more powerful than some of the earlier magnet steels. This latest development means that extremely strong fields may be concentrated in a compact space without the provision of electric current.

The absence of accessory equipment naturally reduces maintenance costs. Under the new order, the only maintenance necessary is the occasional inspection and lubrication of two bearings. Operating costs, moreover, are nil, since no electric power is consumed. Another advantage is the reduced fire hazard, brought about by the absence of slip rings and of sparking. This feature makes possible their use even under explosive conditions.

These "QC" non-electric permanent magnetic pulleys are being manufactured to-day by Permanent Magnets Pty. Ltd., 11-13 McEvoy Street, Waterloo, New South Wales, who, through their association with Quality Castings Pty. Ltd., Waterloo, have acquired long and valuable experience in the manufacture and operation of permanent magnetic equipment.

The obvious merits of the new type of pulley are winning for it a host of satisfied users throughout the Commonwealth. The fact, moreover, that a full range of standard sizes is available is strengthening its position on the market.

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SEE PAGE 26**

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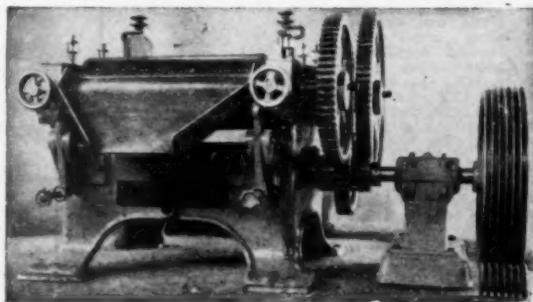
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New Hydraulic Triple-Ram Scrap Baling Press

Occupying an entire building 75 ft. long, 34 ft. wide and 34 ft. high, a hydraulic scrap metal baling press recently installed, is at present baling over a thousand tons of scrap per month at the rate of one bale every three minutes.

The press plant consists of the baling press, loading and conveying equipment, and an hydraulic air accumulator with high-



Capacity of this triple-ram scrap baling press is one bale every three minutes.

pressure pump. The design and layout of the installation ensures economical transport of scrap and bales to and from the press and facilitates maintenance requirements.

The press consists basically of the container and three working rams. The container body is fabricated of strongly ribbed steel walls securely bolted together and lined with renewable hard steel wearing plates. The plates are slotted longitudinally to prevent small pieces of scrap being lodged between them and the ram heads to eliminate any jamming. The container size is 8 ft. 11 in. by 3 ft. 9 in. by 4 ft. 4 in. deep. This allows the loading of bulky and long pieces of scrap. It is closed by an hydraulically operated sliding cover, which runs in four self-aligning wedge

pieces. In its closed position, therefore, the cover is firmly clamped down on the container.

The three rams are arranged to work in sequence, one forward, one sideways and one upwards, so that a compact bale is produced. After completing their pressing movements, the forward and side rams are locked in position and the pressing cycle is completed by the third ram moving upwards. The upward ram is also used for ejecting the bale from the container. The finished bale is tightly pressed and free from fins and jags. The weight of each bale varies between 5 cwt. and 10 cwt., depending on the sort of scrap handled—which includes steel sheet up to 1 in. thick, the bales measuring 18 in. wide by 15 in. high, varying in length from 32 in. to 48 in.

By the side of the press is an hydraulically operated loading bin with a weighing device, fitted with a large dial. A distinctive feature of the weighing device is an arrangement by which the bin is automatically detached from the lifting levers, so that the true weight of the scrap can be accurately controlled. In its loading position the bin is at floor level, so that the run-about trucks which bring the material from the press shop can tip it into the bin with the minimum of handling. This arrangement, and the fact that the control of the bin movements and press movements are centralized, facilitates loading with the desired weight of scrap. Loading takes place whilst the previous load is being compressed in the press. Up to 10 cwt. can be handled at one time, but the normal load is about 7 cwt. When the right weight is reached, the hopper is hydraulically raised and turned over so that its contents are discharged into the container.

The press is driven by a Loewy pistonless air hydraulic

accumulator of 100 gallons useful water capacity, working at 2 ton/in.² working pressure, and a total capacity of 140 cubic feet. The pressure water is fed into the accumulator by a Loewy horizontal three-throw pressure pump of 34 gall./min. capacity, driven by a 150 h.p. motor.

Electrically controlled low-level valves shut off the water supply from the accumulator before the lowest water level is reached, so that no air goes into the delivery pipes leading to the press. In addition, an electric safety device and electrically controlled

acoustic signals come into operation to inform the operator when the highest pressure or the lowest water level has been reached.

All movements of the press are actuated and controlled from a control desk in the required and pre-determined sequence. The control desk is equipped with pressure gauges, showing the working pressure of each ram, and signal lamps to indicate the completion of each stroke. One man has complete control of all operations for loading, pressing and discharging of the material. [2480].

Production of Tyre Cord

2-for-1 Twister is Upstroke and Downstroke

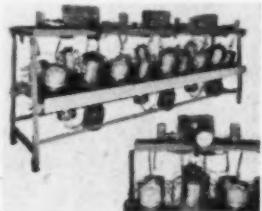
A new 2-for-1 twisting machine does up-twisting, plying, and down-twisting on the same machine. It will be used to produce tyre cord.

The new machine consists of three units, two 2-for-1 up-twisting spindles and a 2-for-1 down-twisting spindle. The up-twisting spindles are designed to run 7,200 r.p.m., and each will insert 14,400 turns per minute. The down-twisting spindle for plying or cabling will run at any speed up to 7,200 r.p.m., to suit the twist combination desired. This simultaneous twisting and cabling is reported to result in a very uniform twist both in the singles and in the cable.

The up-twisting spindles operate in a manner similar to those previously seen on 2-for-1 twisters featuring automatic tension control, but can accommodate 10-lb. cones or smaller if desired. It is also possible to twist from as many as 4 pirms such as are used with nylon or glass fibres.

The 2-for-1 down-twister is quite unique in its operation. The two ends from the up-twisters are delivered to a rotating guide above the down-twisting spindle. The ends enter a rotating plate below the package, are threaded

up through the centre of the spindle, and come out at the top, where they pass through a novel feeding mechanism coupled to the spindle. They then run through a traversing mechanism



Tyre cord is produced in one operation on new 2-for-1 twister which "strands" and "cables" cord continuously. Speed is around 7,600 r.p.m. to produce 10-lb. package. Detail of unit is shown at lower right.

similar to that used to level-wind line on fishing reels. The package, a double-headed bobbin accommodates 10 lb. and is driven at yarn speed by means of a magnetic clutch, to wind on the

finished yarn. This magnetic-clutch assembly is designed to provide uniform winding tension from start to finish. Doffing is accomplished quite simply and easily. Twist variations in singles and cable are unlimited and easily obtained.

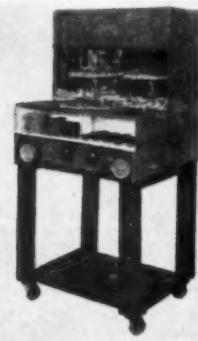
All three units are driven by a common flat belt and are thus synchronized. Production machines are two-sided and are assembled in sections; each side

contains nine spindles for a total of six 3-spindle units per section.

In addition to twisting tyre cord, the units are expected to be useful for twisting glass yarns (which cannot be set but must have a ply twist to compensate for twist in singles), nylon, and cotton after the spinning twist, as well as spun rayon. On 2/200/2 tyre cord yarn, each unit is expected to produce 21 lb. per hour. [2442].

Infra-Red Preheater

Recently introduced to the trade is an infra-red preheater



Infra-Red Preheater.

for preforms. The unit is said to speed-up transfer moulding opera-

tions and to permit moulding larger pieces on smaller presses.

Preforms to be heated can be of any size or shape, but not in excess of 1 in. thick. Additional advantages claimed for the unit include: reduces the amount of moisture in preforms before they are placed in the die, thus improving the electrical properties; increases the dimensional stability of the moulded parts; and speeds up the cure.

In operation, the following procedure is observed: preforms are placed in empty "serving trays" resting on work tables; loaded tray is placed on one of the turntables (the unit is available in two models with one and two turntables, respectively); loaded tray is removed from turntable and heated preforms are loaded in die; empty tray is replaced on work table for another loading. (One turntable is always processing preforms while the other turntable is being loaded and unloaded.) In this four-phase operation, the unit's timers, temperature controls, and switches have been previously set to suit the job in process. [2436].

Special Design Moulding Boxes

There has recently been developed and patented a design of moulding box which offers a number of important advantages. These moulding boxes are at present being made in a variety of standardized sizes up to 4 ft. square.

The main frames are fabricated from a special rolled-steel channel section, giving strength with lightness, while the ribs in the top box or cope, and the cross stays in the drag, are of flat-section steel with swaged stiffening webs. The ribs are perforated and also provided with dovetail notches in the lower edges adjacent to the joint face for the purpose of sand keying. Slots are provided which enable each of the ribs to be adjusted through a distance of 3½ in., and they can also be reversed, for location in the required position. If necessary, the ribs can readily be removed.

It may be noted that the component parts of these boxes are largely standardized and interchangeable so that the construction of non-standardized boxes to

suit particular requirements, can be rapidly undertaken.

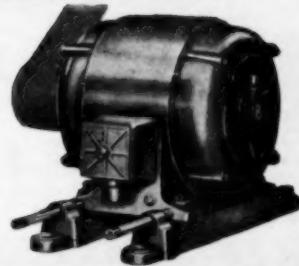
The locating pins are 1 in. diameter and slide in hardened-steel renewable bushes. Boxes can be supplied with two, three or four pins set in various positions in relation to the handles, and for deep boxes, double guide bushes and longer pins can be provided. If preferred, fixed pins can be fitted into the standard bushes. The pin centres are held to close limits so that the cope and drag members of all boxes of the same type can be used interchangeably.

The handles are located on the lateral centre line of each box so that the centres between the handles of any pair of equal-depth boxes corresponds to the depth of one box, thus permitting standardization of the clamps. The handles themselves are easily detachable from the main frame bushes.

Two types of clamp are available, a face-cam type and a link type, incorporating an eccentric bush. These clamps are interchangeable. [2404].

Brook Motors

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EFFICIENCY	POWER FACTOR		MOTOR	DELIVERY
	Full	Half		
81	.78	.82	2½	14
88	.87	.91	20	16
90	.88	.91	40	16

The above table is for "Brook" 1440 R.P.M., Squirrel Cage, Protected Type, Continuously Rated Motors guaranteed within B.S.S. 168.

"Brook" Motors, from fractional to 200 H.P., include Protected, Enclosed, Drip-proof, Flame- and Explosion-proof, Loom, Lift and other types. Warburton Franki have stocks of "Brook" protected motors, which you are invited to inspect.

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Precipitated Calcium Carbonate, as supplied by **John & E. Sturge**, of **Birmingham, England**, is renowned throughout the world for its high standard of purity and uniformity. Progress over the years has been such that Precipitated Calcium Carbonate is now accepted as a member of that group of materials known as Fine Chemicals. With this acceptance has emerged the present nomenclature as distinct from the former title, "Precipitated Chalk."

The term "Chalk" is more and more frequently being used to describe unmanufactured varieties of calcium carbonate and a number of basic materials which are not calcium carbonate at all—blackboard chalk (mainly calcium sulphate) and French Chalk (hydrated magnesium silicate) are excellent examples. In industries of such vital consequence as

Paper-making and paper-coating,
Manufacture of paints and distempers,
Compounding of rubber and plastics,
Pharmacy,
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Fermentation industries,
Manufacture of printing inks,

it is essential that raw material be of the highest standard, and Sturge Precipitated Calcium Carbonate meets all requirements.

Ask for a copy of "Precipitated Calcium Carbonate," a Sturge publication available from the sole agents in Australia and New Zealand.

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Potentiometer Adds or Subtracts Two Variables

The differential computing potentiometer illustrated is made

traction of two variables in a single unit, with one voltage source. Uses include servomechanisms for computing or power amplification, and the direct replacement of two single potentiometers when one is being used for compensation or correction purposes.

The specifications are: body dia. 3.093 in.; flange dia. 3.718 in., guaranteed accuracy, \pm 0.1 per cent; maximum overall resistance (\pm 10 per cent.), 150,000 ohms; electrical angle rotation, 354.5 deg. (\pm 0.5 deg.); mechanical rotation, continuous; power dissipation, 5 watts; torque, 1 inch ounce, maximum; and life service, over 1,000,000 cycles.

This dual unit, through coin-silver precision slip rings in the cover plate, will produce a net voltage sum or difference when one variable rotates the shaft, while the other rotates the body of the potentiometer. [2458].

The New Potentiometer.

primarily for applications requiring the addition or subtraction of two variables in a single unit, with one voltage source. Uses include servomechanisms for computing or power amplification, and the direct replacement of two single potentiometers when one is being used for compensation or correction purposes.

Process Timer and Frequency Meter

A new British process timer is entirely electronic in principle and has no moving parts. It will handle up to 3 amp. at 250 volts. A.C. directly, and is therefore suitable for small machine tools, R.F. heaters, moulding presses and so on. Timing range is continuously variable from 10 to 180 sec., and power supply can be either 100 to 130 volts, or 200 to 250 volts. A.C. at 50 cycles.

The instrument is enclosed in a metal case with a black anodized aluminium panel on which are mounted the controls and signal lamps. It can be used on a bench or mounted directly on machine or work panel.

Three frequency ranges are provided on a frequency meter produced by the same firm, from zero to 200, zero to 2,000 or zero to 20,000 cycles per second, any of which may be selected by a knob on the front panel. Accuracy of reading is claimed to be within plus or minus 1 per cent. of full scale, and instrument is

said to be unaffected by mains voltage variations of from plus or minus 10 per cent.

Input signal voltage is from 0.1 to 20 volts peak to peak. Wave form applied may be of any contour provided it does not pass through zero more than twice every cycle. Power supply is as for the process timer described above.

If desired, the instrument may be used as a tachometer, with the scale graduated in r.p.m. Mechanism having a rotary or periodic motion can be arranged to produce an electrical pulse for each cyclic movement and instrument measures frequency of pulses. An electro-mechanical pick-up device, such as a photocell pick-up head, may be used with the meter to measure vibrations.

A self-checking calibrating device is a feature of this instrument, which is portable, and can be bench or rack mounted. Dimensions are 8½ in. by 6½ in. by 19 in. and weight approximately 15 lb. [2406].

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The fee is 1d. per employee per annum for 1 hour's music daily.
The fee is 2d. per employee per annum for 1 hour's music daily.
The fee is 3d. per employee per annum for 1½ hours' music daily.
The fee is 4d. per employee per annum for 2 hours' music daily.
The fee is 5d. per employee per annum for 2½ hours' music daily.
The fee is 6d. per employee per annum for 3 hours' music daily
or more.

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'Phone: BW 8493

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405 Collins Street, MELBOURNE, VICTORIA. 'Phone: MU 3956.

Agents — S.A.: Mr. Max Chilton, Baptist Buildings, Flinders Street, ADEL AIDE. 'Phone: Central 5116. W.A.: Western Machinery Co. Pty. Ltd., 494 Murray Street, PERTH. 'Phone: BA 2495.

INQUIRIES FOR PLANT MATERIAL AND AGENCIES

"THE AUSTRALASIAN MANUFACTURER'S" INQUIRY DEPARTMENT

This Inquiry Service is for the use of readers of "The Australasian Manufacturer" who wish to trace suppliers of Plant, Equipment and Materials, and for particulars of agencies offered. Address your inquiry to the Inquiry Department, and give the fullest possible particulars to enable us to put you in touch with the best sources of supply. **INCLUDE A STAMPED SELF-ADRESSED ENVELOPE WITH YOUR INQUIRY.** It is essential that telephone inquiries be confirmed by letter. No charge is made for Inquiry Services, but normal advertising rates will be charged if agencies are sought by manufacturers' representatives or if goods are offered for sale. For the benefit of new subscribers, inquiries will be published in two or more consecutive issues.

SPECIAL NEW INQUIRIES.

WHEN REPLYING to an Inquiry, please quote the Reference Number and send your reply to the Inquiry Department, "The Australasian Manufacturer," 16 Bond Street, Sydney. **INCLUDE A PLAIN, STAMPED ENVELOPE** so that we can forward your reply to the inquirer.

COPPER TUBING WANTED: Queensland firm requires urgently 3,000 ft. of 3 in. O.D. x 20 gauge Annealed Copper Tubing in coils or straight lengths. Write Ref. 8167, c/o "The Australasian Manufacturer."

STEEL STANDS — FABRICATION WANTED: Established distributing company would like to hear from fabrication engineers who are able to make up steel stands from 1½ in. x 3/16 in. angle iron, with 14 gauge braces. Regular quantity required. Write Ref. 8168, c/o "The Australasian Manufacturer."

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CORE BLOWER WANTED: A New Zealand firm wants a foundry core blower, Gibsons 1A, 2A or similar. Write to Ref. No. 8162, c/o "The Australasian Manufacturer."

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WANTED: Progressive Melbourne firm wishes to extend its operations to N.S.W., and requires Manufacturing Capacity in Sydney for complete manufacture and assembly of light machines. Work involves welding, machining and fitting. Materials required in good supply. Constant contract assured. For further particulars apply to Ref. 8163, c/o "The Australasian Manufacturer."

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COVERS, KEY RINGS, ETC.:** Manufacturers in a position to supply a Brisbane organization with Celluloid Match Box Covers, Celluloid Key Rings and Celluloid Calender Cards, are requested to write to Ref. 8165, c/o "The Australasian Manufacturer."

TAPS AND DIES AVAILABLE: Melbourne manufacturer has for sale the following N.F. Ground Thread, G.T.D. Taps and Dies: 0-80, 1-72, 2-64, 4-48, 6-40. Write to Ref. 8166, c/o "The Australasian Manufacturer."

ELECTRICAL CONNECTORS: Government Department desires to contact the Australian Agent for Simmonds & Stokes Ltd., of London, makers of "Niphon" brand electrical connectors. Alternatively, they desire to contact Australian manufacturers capable of supplying a corresponding range of connectors, which would be interchangeable with "Niphon" plugs and sockets, which are used

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**BITUMEN MATERIALS —
AGENCY AVAILABLE:** A large British firm specialising in the production of Bitumen materials — anti corrosive solution, wood preservative, bituminous solution and enamel disinfectant fluid and sprays, marine glue, and compounds and varnishes for the electrical industry — is interested in appointing an Australian organisation to represent them in all States of Australia. The name of this firm will be supplied

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Our comprehensive range of lines helps our men
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on application to Ref. 8159, c/o "The Australasian Manufacturer." For further information, write to Ref. 8161, c/o "The Australasian Manufacturer."

MILD STEEL BARS WANTED:
Sydney firm urgently requires to purchase mild steel bars (bright or black) 1 in. x 1 in. or 1 in. x 1 in. Any quantity appreciated. Replies to Ref. 8160, c/o "The Australasian Manufacturer."

WILL YOUR PLANT PRODUCE SAWS? Adelaide organisation is seeking firms in any State or in United Kingdom with existing or potential capacity to produce hand, panel, tenon and circular saws, to supply an already established market. The firm states it can, if necessary, help with steel supplies. If inter-

ested, write to Ref. 8161, c/o "The Australasian Manufacturer." STEEL TUBE AND CONDUIT
WANTED: 1,000 yards of 1 in. Diameter Steel Tube and 1 in. Diameter Screwed Conduit urgently required by Sydney Manufacturing Company. Reply Ref. 8155, c/o "The Australasian Manufacturer."

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Approval and Test Specification C. 146-1949, Domestic Electric Ranges, is a completely new specification.

Approval and Test Specification C. 102-1949, Electric Grillers, has been revised and extended to cover Type A grillers with open or only partly enclosed elements, and, in addition, Type B grillers with completely enclosed elements. There is much in common between the two specifications, and, for approval purposes, a distinction is made by which all appliances with an additional heating element in the oven are treated as electric ranges, while other appliances are treated

as electric grillers. Thus, for approval purposes, table cookers, with an element in the oven, are ranges. Similarly, C. 102 covers many appliances which are outside the ordinary trade designation of "electric griller," such as boiling plates, grill boilers, some table cookers, and even the heating portion of coffee percolators with detachable containers.

Copies of the standard may be purchased from the headquarters of the Standards Association of Australia, Science House, Gloucester and Essex Streets, Sydney, or from any of the Association's Branch Offices in each State of the Commonwealth and Newcastle, N.S.W.

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High Carbon Spring Steel
Wire, Hardened and Tempered
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specifications and for all
Engineering purposes.

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Founded over 60 years ago by David Richardson, The Richardson Gears Pty. Ltd., of 17 Whitehall Street, Footscray, Victoria, has achieved, in that time a reputation of world standing amongst organisations engaged in filling the ever-increasing demands of modern industry for accurate, silent gears.

Equipped with one of the most extensive and up-to-date gear cutting and generating plants in the Southern Hemisphere and backed by years of intensive research and accumulated experience, this Company enjoys a leading position in Australia, both for quality and output. It is with considerable pride and satisfaction, therefore, that the principals are able to review the years of progress and the extent of their activities.

RIIGHT from the beginning in 1888, it has been the policy of The Richardson Gears Pty. Ltd. to keep abreast always of the most modern and progressive developments in gear production throughout the world. It was in

ciation with leading overseas companies has made available, for manufacture under licence in Australia, the latest overseas gear developments and production techniques for all types of gear transmission.

achieve their unusually high thermal efficiency, these Worm Reducers were designed and produced after more than two years of painstaking research, and represent the greatest single advancement that has been made in this type of gearing.

As the "thermal rating", or load which may be transmitted without overheating the housing, is usually the limiting factor in industrial worm gears of orthodox design—the advantages of this new approach to the problem will be appreciated once the salient features of construction are grasped.

Cooling is carried out in a novel manner which consists of a scientifically designed housing provided with vertical ribs to assist cooling by convection in conjunction with a fan driven by the worm which directs an air blast over the housing. In this way the full advantages of high precision worm and wheel gearing are obtained, while the higher thermal rating allows Radicon Reducers to be used in smaller units for any given load.

Requiring no attention beyond a periodic checking of the oil level, they are automatically lubricated. The method employed involves neither pump nor any other auxiliary mechanism which might cause damage or delay by breaking down and operates in either direction of rotation.

Other factors contributing to the remarkable efficiency and capacity for hard usage of Radicon Reducers are:

(1) The Worm is integral with its shaft and proportioned to combine efficiency with strength. Made of special quality case-hardened steel, the worm threads are generated and subsequently profile ground.

(2) The Worm Wheel consists of a "Taurus" bronze centrifugally cast rim of substantial section securely mounted on a rigid centre.

(3) The teeth are accurately generated to ensure correct tooth contact, quiet running, and high load carrying capacity.

(4) The rating of each unit is determined relative to its strength, its wearing life, and working temperature—all of which factors must be balanced to

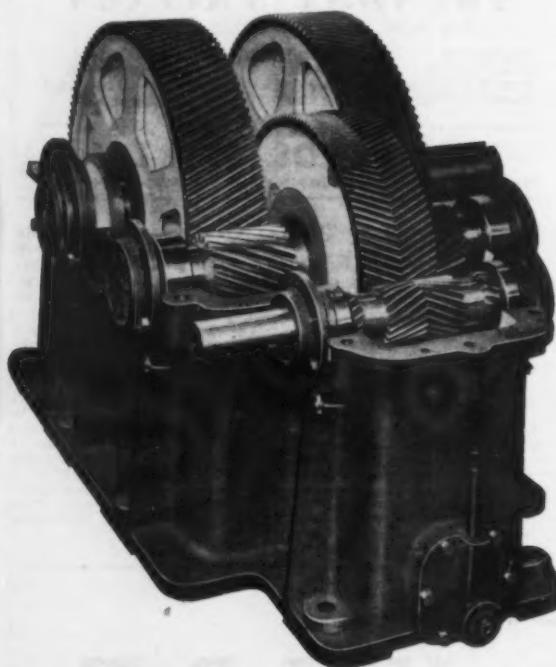
give the most economical and satisfactory results.

(5) The worm and wheel shafts are carried on ball or roller bearings throughout, accurately fitted, and requiring no attention or adjustment. Radial and thrust loads are taken by radial thrust type ball bearings, whilst an additional roller bearing can be provided in cases where overhung loads have to be carried by the wheel shaft.

(6) Bedplates and holding-down bolts, together with flexible or rigid couplings, clutches and brakes are furnished where required, but it is recommended that, when gears and motors are to be mounted on combination bedplates, the motors should be sent to the works for lining up and dowelling.

Radicon Worm Reducers are made in three principal types, designated RHU, RHO and RHV. The symbolism word has a definite significance. The first letter refers to the product, the second to the plane of the worm, and the third to the relationship of the worm to the low speed shaft, or the plane of the low speed shaft. Thus, RHU type signifies a horizontal worm spindle located under the wheel; RHO type means a horizontal worm over the wheel, and RHV type, a horizontal worm and vertical wheel shaft.

There are other variants made as standard units such as RMVH type which is a motorised unit comprising an inbuilt vertically mounted flanged motor driving a



"H.C." Type D.H. Speed Reducer.

furtherance of this aim that world-wide associations have been developed with such leading firms as—

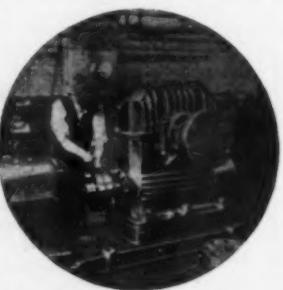
David Brown & Son (Huddersfield) Ltd., and their subsidiary and associated companies.

J. Stone & Company Ltd., Deptford, England.

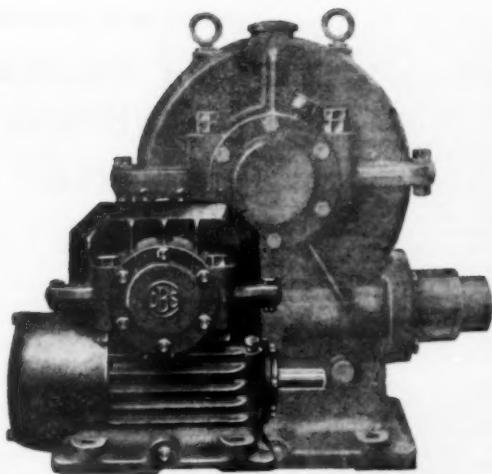
Coupled with their own research and experience, this asso-

RADICON WORM REDUCERS. Of the gear transmission equipment produced by The Richardson Gears Pty. Ltd., under licence from David Brown & Sons (Hudd.) Ltd., perhaps the best known and most widely used are the Radicon Worm Reducers.

Deriving their name from the words "Radiation-Induction-Convection" by which means they



"Radicon" Worm Reducer.



Comparison of "Radicon" and ordinary worm reduction gears for the same duty.

vertically disposed worm spindle, and having a horizontal low speed shaft. Again there are standardised compounded units designated, RHUD, RHOD and RHVD types. These units have a shaft disposition as previously described, except that the additional symbol D signifies that they have a primary stage of worm gear reductions attached to drive the main worm spindle, and thereby, very large overall reductions of speed are achieved.

Similarly types, RHUF, RHOF and RHVF refer to compounded units, the primary stages of which are attached helical gearing to give high and efficient overall ratios, at the same time preserving the characteristic "right angle drive" of the worm gear, often a valuable attribute for space conservation.

Reducers may be assembled with shafts arranged either right or left hand to suit requirements. The hand of assembly refers to that side of the housing, from which the low speed shaft projects when viewing the Reducer from the motor position.

Thus, if the low speed shaft lies nearest the observer's right hand, the shaft assembly of the Reducer is Right Hand. When ordering, the hand of assembly should be stated.

Special adaptations of Radicon Speed Reducers are made for conveyors, stirrers, overhead travelling cranes, capstans or as a "Carpotter". The latter, which is made with a vertical bollard, is designed to provide a rugged, silent and exceptionally compact unit for moving rail cars and other heavy loads along the ground.

In addition to these and many other adaptations of the Radicon Worm Reducer, The Richardson Gears Pty. Ltd. design and generate Worm Gearing for every type of special purpose. Their long familiarity with the problems of worm gear design, and extensive, up-to-date plant, enables them to operate to the most exacting modern standards.

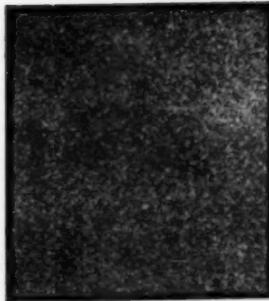
With tool-room facilities for the production of the necessary cutters, and modern worm-wheel hobbing machines which accurately generate the teeth within finest practical limits, they also maintain their own foundry for casting "Taurus" Phosphor Bronze Wormwheels. This is done by the centrifugal process, where necessary, to improve the grain structure and add strength and wearing qualities.

HELICAL GEARS.

Another important division of production is devoted to milling.



Correct Marking on Worm Wheel Teeth.



(Left): A typical macrograph showing the grain size of a centrifugal casting; magnification, four diameters. (Right): Typical grain size of a large sand casting; magnification, four diameters.



hobbing, generating or planing-generating helical gears—each method having definite characteristics which make it most suitable for the different service conditions to which it is best adapted.

In producing single helical gears by any of these methods, the helix angle of the teeth may be varied, therefore there is no definite relationship between the diameters or working centres of the gears, and the number of teeth and normal pitch used, until the helix angle has been chosen.

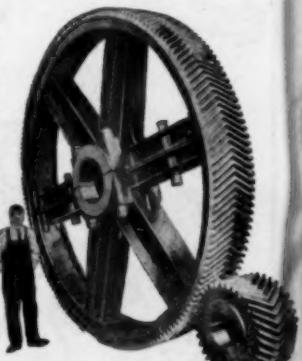
In making double helical gears, this feature applies to the milling and hobbing-generating processes only, and a central gap must be provided between the opposite faces to allow run out clearance for the cutters.

In the planing-generating process the helix angle of the teeth is fixed, and therefore there is a definite relationship between the diameter of the gear, and the number of teeth and pitch, the same as in spur gearing.

For double helical gearing, the planing generating process has considerable advantages over a wide range of service conditions, and because the teeth may be cut solid to the apex without any central gap being necessary, extreme robustness is achieved, together with economy of material.

due to smaller overall face width.

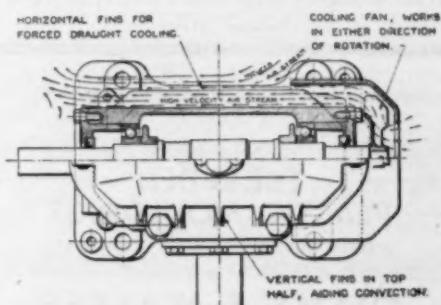
With continuous tooth type double helical gearing, the rotation should be arranged so that the solid apex is always leading.



Double-Helical Gearing.

This is necessary to avoid trapping of the lubricant at the central point of mesh.

For reversing drives a small central gap is needed where oil is



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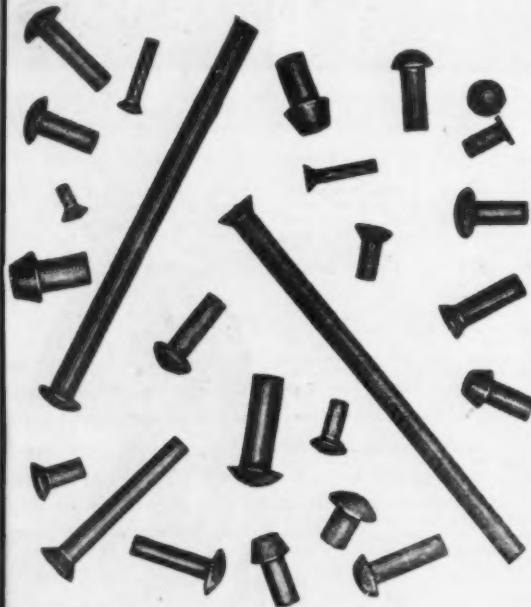


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used as the gear lubricant, but this gap is for oil relief only and, by using the planing process, need not be as wide as that required when hobbing the gears.

MESHING CHARACTERISTICS.

Helical Gears are stronger than straight spur gears, not only because of the greater length of tooth section carrying the load, but also because of the smoother running and the minimisation of load fluctuation as the teeth pass through contact.

A spur gear tooth entering contact receives the load suddenly on the tip across the whole face width, the total load in the best possible condition being shared by two or three teeth according to their position in the contact zone.

Therefore, the actual load on each tooth suddenly fluctuates between 100 per cent. and approximately 70 per cent. of the total load as it passes through the zone of contact.

On a helical gear the contact is at all times distributed over a large number of teeth and thus load fluctuation is eliminated. Furthermore, on the helical gear each one of the many contact lines extends from root to tip, and, as the gear rotates, passes in a longitudinal direction across the face width, whereas in a spur gear the contact line suddenly appears at the tip across the full face width and passes down to the root of the tooth.

For this reason, not only is the disposition of the contact lines on the helical gear productive of a smaller bending stress, but the direction of their movement is such as to balance out any tendency to pulsation.

Greater strength, however, is not the only advantage possessed by the helical gear. No less important is the quieter running due to the gradual application and absence of fluctuation of load. On this account helical gears may be used at speeds quite impossible with straight spur gears, and even at quite moderate speeds there is a marked difference in noise.

Generally speaking, a higher helix angle produces quieter running, but on the other hand normal tooth pressures increase, thus introducing a limit to increase in helix angle.

In helical gear design, whilst giving attention to tooth strength and fatigue resistance, it is necessary to bear in mind the resistance to abrasion and the question of frictional and oil churning losses. Equally as important as correct tooth design is the proportion of blanks, rigidity of shaft mountings, and suitability of housing.

DESIGN OF BLANKS.

Metal thickness and rib disposition must be fixed with due regard to (1) the necessity for sound castings and the elimination of contraction stresses; (2) limitation of load stresses; (3) minimisation of arm and rim deflections under load; (4) avoid-

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ance of vibration and resonance periods.

All these factors must be considered in relation to each other so that one advantage is not secured at the expense of another. The care which The Richardson Gears Pty. Ltd. exercises in design, which is comprehensively organised on broad lines, ensures that every factor is taken into consideration.

MATERIALS.

The selection of most suitable materials for particular duties is influenced by many factors, amongst which are the available space, running space, facilities for lubrication, nature and duration of loads and overloads, and condition of surrounding atmosphere.

A high tensile cast iron or semi-steel gear meshing with a medium or high carbon steel pinion is a satisfactory combination for ordinary speeds and loads. For high speeds and heavy loads it is essential that both gears be made from steel of high strength and good wear-resisting properties.

Where shocks are to be met, the steel should also have high impact value, high tensile strength alone being insufficient. In dust-laden atmosphere it is often necessary to adopt surface hardening or case hardening steels, particularly if the dust has abrasive qualities and precautions are not taken to exclude it.

By filling in a data sheet supplied by The Richardson Gears Pty. Ltd. covering loads and overloads, horsepower or torque to be normally transmitted, speed of driving and driven shafts and a number of other details and measurements, the client is assured of gearing designed and generated exactly to cover the service conditions which it will encounter.

An additional service is available for cutting teeth in customers' own blanks. Here again details are required of speeds, nature of duty and degree of precision required so that the most economical method of production consistent with service requirements may be adopted.

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Increasing attention has been given of late years to the use of plastics in Gears and Pinions and The Richardson Gears Pty. Ltd. have taken to this field, as well as in the production of metallic gears.

Recommended by designers to fulfil special functions for which plastic gears possess certain characteristic advantages, these are not meant to supplant all gear materials. They are generally used in conjunction with metallic gears and a good grade of cast iron has been found to be the best material for the mating wheel.

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ions the fabric used is strong cotton duck or canvas ranging down to a finely-woven cotton for light duty gears and pinions.

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A large range of "David Brown" Precision Spur and Helical Gear Hobs is stocked by The Richardson Gears Pty. Ltd. and experience has shown that these cover practically all normal requirements. By their use production is accelerated and accuracy is maintained over a greater number of gears than is otherwise possible, due to a superhardening to which these hobs—which are of high speed steel—are subjected after the final grinding. They are easily distinguishable by the slightly matt finish which is inherent with this process.

Each hob is clearly marked with an order number for identification purposes and also with a symbol indicating the steel used and the following data for use in setting and sharpening:

Pitch and pressure angle of gears cut.

Cutting Depth in inches.

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Number of threads.

Worm Angle.

Lead of gashes in inches or "straight" gashes where applicable.

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RICHARDSON COUPLINGS.

The Richardson Gears Pty. Ltd. also produce an extensive range of "Cone Ring" Flexible Couplings, "Cone Ring" Brake Drum Couplings, "Geartex" Flexible Couplings, Spring Grid Couplings, Rigid Couplings, as well as "Gearalign" Self Aligning Couplings in Standard, Mill Motor and Floating Shaft Types.

Covering the full range of coupling requirements, these installations have received wide support from industrialists, and full details will be supplied on application to the makers or their representatives.

CONCLUSION.

While it has been possible, within the scope of this article, to deal only briefly with the activities of The Richardson Gears Pty. Ltd., which has a trading area taking in New Zealand, Malaya, and the Pacific Islands as well as the Commonwealth of Australia, detailed information will be gladly supplied on application to any of the following addresses: N.S.W.: Ernest J. Armstrong, 16 Barrack Street, Sydney; H. E. Dingle, 62 Scott Street, Newcastle; R. I. Ray & Co., 96 Wentworth Street, Port Kembla.

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Production Planning

The determination of what is to be made, when it shall be made, where and by what methods, how much and at what cost

Economic production in an engineering works necessarily requires that planning, using the word in its broadest sense, must first be employed for the formulation of a programme for the entire organization. The process begins with the plans of the board of directors and extends to the smallest group of workers. It embraces principally finance, the functions of selling, cost accounting, the layout of the plant, departments and equipment, the routing of materials through the shops, scheduling the time for the start and completion of the various jobs, and the anticipation and satisfaction of the total requirements in respect of labour and material.

Production planning is, therefore, basically concerned with the determination of what is to be made, when it shall be made, where and by what methods, how much and at what cost.

IN the typical small shop the superintendent and a production clerk only may control the flow of work. In larger organisations this task is carried out by a planning department, an engineering department, or some other appropriate section of the organisation. Some of the more detailed functions of the typical production planning department, says Irwin Hayworth in "The Times Review of Industry," would include: advice on the design of the product, or possibly even prior approval of the design; provision of the necessary patterns and tooling for manufacture, for example, jigs and fixtures, dies and other equipment; determining and specifying the kind and amount of raw materials, half-finished materials, finished materials, machines and equipment to be purchased; selecting and discovering methods for doing the work itself; routing and scheduling the work as it goes through the shops, and setting standards of quality and quantity. The department should employ cost accounting, time study, or other techniques that expedite the work, while control of the stock room, supervision of the maintenance of equipment, responsibility for records of all kinds, the estimation of labour requirements, the selec-

tion of methods of transportation, and such additional items as the safety programme, are other functions of the section.

PRELIMINARY ANALYSIS.

In all industries the essential preliminary to successful planning is an accurate analysis of all phases of the proposed manufacturing operation. A general guiding principle which seems obvious, but is not always realised in practice, is that all employees, machines, and equipment, as well as the actual material, must be profitably employed. Planning in its simplest form is usually encountered in a works manufacturing a standard product of straight-forward design. The superintendent merely gives a bill of materials or specifications to the foreman, and then confines his planning to personal supervision of the processes, giving special attention to any interference with the routine which may be occasioned by a rush order or other unusual requirements. A more advanced form of planning in the small shop is encountered when a production department operates under the direction of the superintendent.

This department creates a master schedule of production upon which is based a manufacturing-order

system. The schedule lists the orders and the dates on which they are to be completed and component parts of the order are always issued in such a way that the whole job can be completed on the specified date. Periodical reports are

required from the staff, and shortages and delays are investigated and corrected. In still more complicated systems direct control of certain functions bearing directly upon the effectiveness of the production department—for example,



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the operation of toolrooms, transport in the shops and the maintenance of equipment, requisitioning workers to be hired by the personnel department, etc.—may be exercised. Alternatively, a separate department may be formed for the purpose.

There are several advantages in having such a planning department if it is justified by the size of the plant and the nature of the operations performed. It helps to increase production by making use of all equipment to the fullest extent. It also tends to reduce obsolescence by keeping machines and equipment in repair and ensures that plant layout is up to date. Further, it assists in maintaining steady employment for the workers and provides for a balanced assignment of labour to various tasks. The responsibility for planning is centralised, and records, methods and costs are so compiled that future plans have something tangible to follow.

An important part in this type of organisation is filled by the foreman. In a modern works he must not only have the necessary practical knowledge and experience, but also be familiar with the methods of requisitioning materials and supplies, of making assignments, keeping up with the progress schedules, and furnishing accurate reports. He should also act as liaison officer between the working force and the planning department, keeping the latter informed on the causes of any discontent among the men arising from wage rates, working conditions, and other sources of trouble with labour.

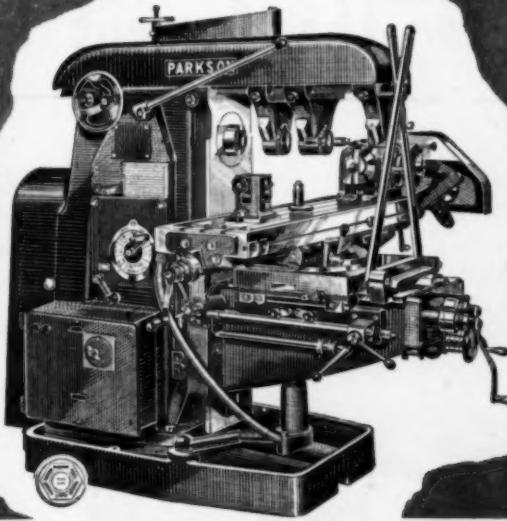
The object of production planning, therefore, is the preparation of a manufacturing programme which outlines the flow of work and provides for its proper control. The process may conveniently be subdivided under the three main heads of routing, scheduling and despatching. Routing is the term generally employed for a function which is exercised from the department responsible for tool design. It establishes the various manufacturing operations and fixes their order and also determines the types of machines, and often the particular machines or work stations, on which operations are to be performed. It lists the tools to be used and allocates time for the operations, indicating at what points there shall be inspection, and further divides the work into the most economical manufacturing lots or quantities to be handled at any given point in the schedule. Finally, this sub-section provides

the proper forms for the clerical force to record the progress, costs, and other necessary data. The efficiency of routing is obviously greatly influenced by the existence of a good layout in the plant which facilitates a straight line flow of work and helps to eliminate the possibility of bottlenecks.

Scheduling comprises the organisation of the proper quantities of material and the sequences of deliveries for orders, following the pathway of the work established in routing. The duty of this subsection is to establish the time when all or part of a manufacturing order will start, when it will be completed, and the sequence in which lots or parts of a batch will flow. It also determines the volume of the flow, so that there shall be no surplus or shortage at any point, and regulates all the processing which may be necessary in the course of manufacture. The system is based on estimates of the exact quantities of materials required, a detailed analysis of the time for each operation, as shown from a time study or from previous performance, and the actual conditions which exist in the work shop. Where the system works efficiently the date and hour of arrival of an order at any department from the start of the order until its completion can be predetermined.

COMPLETION ON TIME.

When orders have been properly scheduled, the third feature of planning, effective despatching, comes into play, and ensures their completion on time. The duties classified under this heading may be distributed among a number of people, and usually cover transport in the shops, reports on the progress of the work, the control of job cards and other records, the assignment of work to machines or workmen, and its reassignment to meet changing conditions. One important responsibility of this section is the advance provision of tool lists, and, to give an instance of the methods sometimes adopted, it may often prove expeditious to hire a boy as runner to the toolroom. Despatching also includes moving material from one operation of inspecting station to the next, as determined beforehand by the route sheet, keeping a time record of the start and completion of each job or operation, recording the occurrence of spoiled materials and defective work, and taking the necessary steps to have the material replaced and the causes of the damage eliminated. It further involves recording the



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idle-time of men, machines and equipment to enable the reasons for the idleness to be discovered and the proper authorities to be notified.

The management, of course, usually tries to schedule the output

of a plant as far in advance as possible. At the beginning of the production programme it is the responsibility of the planning department to consider the orders accepted by the sales department. From this information the master

schedule is prepared. The master schedule thus shows for some time ahead, often for many months, the sequence in which the orders should be put through the plant and the dates on which order should be ready for shipment.

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When this schedule is completed, the manufacturing orders which are based on it are made out by the planning department. The different considerations affecting all the orders are carefully weighed and corresponding items are grouped into a common manufacturing lot which is then further subdivided into economical manufacturing units. Various prefabrications and sub-assemblies of standard parts, on many orders and on different models, are pooled in this fashion.

Manufacturing orders are the orders finally issued to the production departments instructing them to turn out a given quantity of a particular product in a certain time. Whether the orders will be handled in a simple manner or with the aid of various written forms depends on their nature and the capacity of the plant. All the necessary information for guidance in proceeding with manufacture should be contained in these orders, and it is primarily the duty of the foreman to see that the details are complete and accurate.

The numbers and types of the forms used in the despatching sections of different plants must naturally be a matter of great diversity, but the more common are the route sheet, the job ticket, the stores-issue card, the instruction card, the move ticket, the inspection ticket, the idle-man ticket, the idle-machine card, and the work-identification tag. Large firms with a highly varied output may also use many others. Whatever the system, the purpose of all such records is the economical control of operations. It is possible, of course, with faulty planning, for the system devised to be so elaborate that it interferes with the proper duties of individual workers or even of whole departments, but, under present conditions, the danger that records may be so inadequate that nobody knows where anything is or how much is available is perhaps more probable. A successful system must obviously be simple in conception while being inherently capable of giving at any time an account of the work, in all its

(Turn to page 38.)

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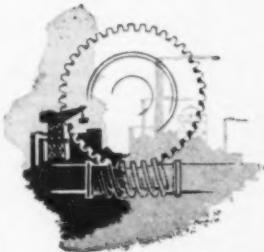
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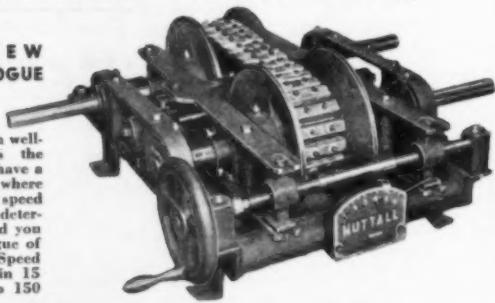
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(Continued from page 38.)
stages, as complete as the management may think necessary.

Mechanical systems are frequently used in conjunction with despatching and often incorporate the use of control boards, charts, route files, time clocks or stamps to give the executives prompt and accurate information on the work in progress. In the final analysis, the details of the system adopted are less important than the principle of establishing a central department to be re-

sponsible for manufacture in the way which has been outlined. Once it is in full swing, with staff of the requisite calibre, it will be found indispensable to efficient production.

NEW ELECTRODE.

MILD STEEL "FLEETWELD."

The manufacture of a new mild steel arc welding electrode, designed for extreme ease of operation in all positions, has just been

announced by the Lincoln Electric Co. (Aust.) Pty. Ltd. The new electrode is known as "Fleetweld 47," and is an addition to the already comprehensive mild steel "Fleetweld" electrode range.

"Fleetweld 47" is an all purpose electrode, and is outstanding for such applications as single pass fillet welds in the horizontal position, and for prepared butt and fillet joints in the vertical and overhead positions. The electrode is designed for operation either on A.C. or D.C.

A low spatter loss at high current, and extreme ease of slag removal, are distinguishing features of this electrode, and are respon-

sible for a general reduction in overall welding costs. Bead shape control in all positions is particularly good, and welds are very smooth and even in appearance.

"Fleetweld 47" complies with the S.A.A.—A-18 Code, and is approved by Lloyd's and the American Bureau of Shipping for welding A.S.M.E. U69 and U70 pressure vessels under insurance requirements. Physical properties in the as welded condition are:

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H. Stevens Pty. Ltd., 406 Crown Street, Sydney—Leather Goods.

Summers Motor Body Works, 159 Botany Road, Waterloo—Motor Body Builders.

H. B. Waldron, 6 St. Johns Avenue, Gordon—Mechanical Engineering.

Gold Crest Handbags, 130 Addison Road, Marrickville—Handbags.

Pioneer Pattern Co., 105 Joseph Street, Lidcombe—Pattern Making.

Central Fibrous Plaster Works, 6 Fortrill Avenue, Bankstown—Fibrous Plaster.

Young & Mitchell, 144 Young Street, Carrington, Newcastle—Metal Venetian Blinds.

K. A. Gam, Main Creek, Dungog—Timber and Joinery.

T. J. Hancock & Sons, Eckles-ton, via Patterson—Timber and Joinery.

N. West, 47 York Street, Gosford—Clothing.

H. E. Bradley, Wyong Creek, Wyong—Timber and Joinery.

Alf. Stevens & Sons Pty. Ltd., Dillwood Street, Bowral—Timber and Joinery.

Criterion Construction Co., Cobbra Road, Dubbo—Timber and Joinery.

Zuberas Cordial Co., 50 Spring Street, South Grafton—Aerated Waters and Cordials.

Hanrios Cordial Factory, 7 Angus Avenue, Kandos—Aerated Waters and Cordials.

A. W. Hansor Pty. Ltd., Church Street, Port Kembla—Industrial Gloves.

R. G. Shoemark, 234 Edward Street, Wagga Wagga—Furniture and Cabinetmaking.

George R. Henley, 25 Market Street, Wollongong—Joinery.

A. T. Collins Engineering Co., Forrela Street, Yamba—Mechanical Engineering.

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Le Mill Plastics Pty. Ltd., rear 3 Lithgow Street, Abbotsford—Plastics.

Reinser, H. & L., 651 Burwood Road, East Hawthorn—Leather-goods.

Traugott, E., 201 Canterbury Road, Canterbury—Toys.

Hatton, S. H., 183 High Street, Preston—Toys and Furniture.

Zachariah & Smith, 276 Hoddle Street, Abbotsford—Footwear.

Armitage, M., 24/26 Heidelberg Road, Clifton Hill—Springs.

Wilson, C. J., Pty. Ltd., Station Street, Lake Boga—Men's Clothing.

West, A. G., 58 Weston Street, Brunswick—Ignition Coils.



A tandem rolling mill in action at the Lysaght works, Port Kembla.

Ever since its inception, John Lysaght (Australia) Pty. Ltd., has followed a policy of plant expansion designed to meet Australia's ever-growing demands for sheet steel. Increased population and widespread industrial development, however, have made ceaseless calls on the Company's productive capacity with the result that even today's vastly increased tonnage is far short of the

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Sadler, Tonnes & Bovendorp, 249 Glenhuntly Road, Elsternwick—Clothing.

Tame, A. E., Toolern Vale Road, Diggers Rest—Wire Products.

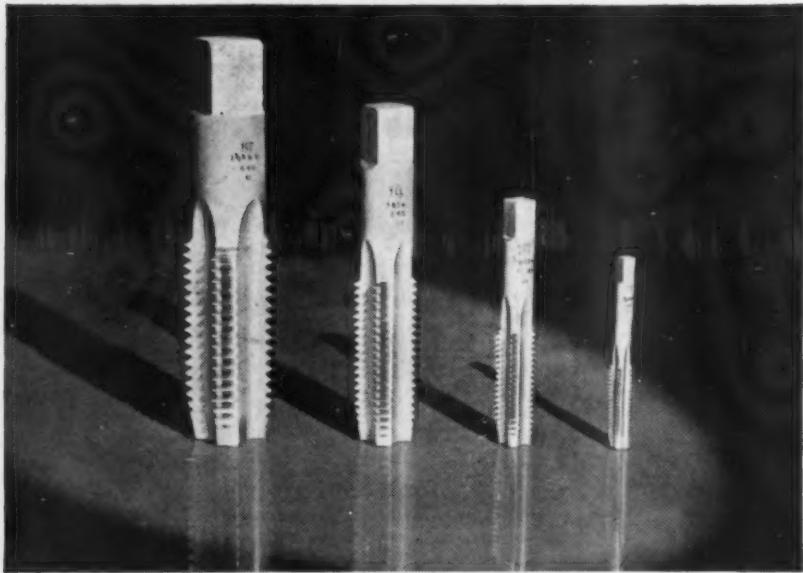
Olympic Tyre & Rubber Co. Ltd., Pier Street, Altona—Rubber Goods.

Jones, A. L., Lake Boga—Motor Repairs.

PROTECTIVE BOOTS AND GLOVES.

The Standards Association of Australia announces the issue, for public review and comment, of three draft Australian standard specifications, two for protective

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SMALL TOOLS

boots and one for protective gloves for industrial purposes, as follows:

Documents 139 and 140 (under one cover): Protective Steel Toe-caps used in Industrial Safety Boots; Heavy Safety Boots fitted with Protective Toe-cap.

Document 141: Industrial Leather Gloves and Mittens.

As a guide for protective toe-caps and safety boots, the committee concerned consulted British Standard No. 953 for "Strength Tests for Protective Toe-caps of Boots used for Industrial Purposes" and the American War Standard No. Z41.1 for "Men's Safety Shoes."

Special tests also showed that the material most likely to meet the tests in Document 139 is a properly tempered 0.8 per cent. B.G. carbon steel. Toe-caps as in Document 139 may be used in various types of footwear, heavy leather safety boots, rubber safety boots, clogs, etc., according to the needs of industry.

Document 140 deals with the particular type of boot with a protective toe-cap in general demand of foundries, steel works, railways, coal mines and the like, and gives the minimum requirements for design and construction. This work may later be extended to include safety footwear for other sections of industry.

Document 141 deals with all specification requirements for industrial leather gloves and mittens. For gloves, the most popular styles now made in Australia have been followed and are designated A.S. (Australian Standard) 1, 2 and 3, and the requirements of the leather for each type, and recommended thickness of leather for different parts, as well as recommended threads and numbers of stitches, have been included. It was remembered by the committee that seam strength is an important factor which may be a source of weakness even when good materials are used, the quality of workmanship being of decisive importance.

The methods of test inserted in the draft are such that difference of view may be experienced. The committee concerned is specially anxious to have the constructive opinions of chemists engaged in leather testing for further guidance.

Copies of the drafts can be obtained from the Standards Association of Australia, headquarters, Science House, 157 Gloucester Street, Sydney, or from branch offices in all capital cities of the Commonwealth, to which addresses comments on the drafts should be sent before 15th July, 1950.

TERRA COTTA ROOFING POSITION.

Mr. W. E. Dickson, M.L.C., N.S.W., Minister for Building Materials, states that the roofing position continues to improve in that State, and a record output of terra cotta roofing tiles was achieved in November: the total being 2,250,000. In addition, 764,000 concrete tiles were made, also a record, previous peak being 647,000 in September.

F.G.S. RIVETS *They Fit - They Hold!*



No, we don't claim that F.G.S. Rivets were the choice of King Arthur's Knights; but rivets to-day can have many a tough job, too. We don't make rivets for bridges or skyscrapers, but if it's small rivets (particularly in the electrical and automotive fields) we can supply the right rivet for every job.

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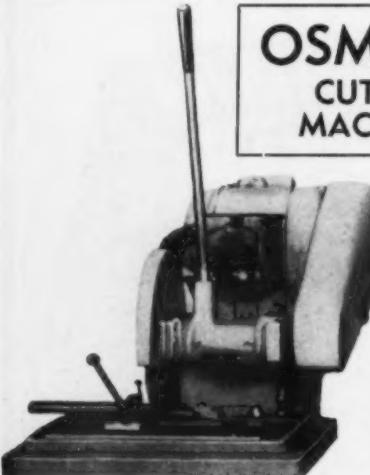
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- Graphited Penetrating and Lubricating Oil

**RADIO FOR FLEET OF
DREDGERS.**

The use of V.H.F. radio to control a fleet of dredgers is a new application for this versatile communication system, and the Ribble Navigation Department of the County Borough of Preston, in England, has found that the ability to make a telephone call to its dredgers is a valuable aid in keeping navigable the channel leading to the Dock.

Normally, every year about one million cubic yards of sand and silt have to be dredged from the trained channel to maintain the necessary depth of water for navigation, and this was done by three sand dredgers. With the deepening of the river which is now in progress, seven sand pumps are operating, and are capable of working to a depth of 46 feet below the water level and removing annually about 2,500,000 cubic yards.

The sand pump dredgers leave the Preston Dock each Monday and work in the River and Estuary until the following Friday or Saturday. During this period the crew live on board. It is therefore important, from the point of view of giving working instructions, that there should be close contact between the masters of the vessels and the Dredging Superintendent, who is responsible to the Harbour Engineer for the maintenance of the navigable channel.

Normal marine radio working would have been possible, but, owing to the various international rules, it was felt that something simpler and more "telephone-like" should be installed.

Mr. A. H. Howarth, M.Inst.C.E., the engineer and general superintendent of the Ribble Navigation, approached the General Electric Co. Ltd. and, together with the company's radio engineers, planned the scheme that is now in operation.

Single-unit transmitter/receivers are used, working on frequencies in the 160 Mc/s band. The transmitter power is 10-12 watts, and the

shore station aerial is mounted on a tall chimney at the South-side power house of the Dock. Two-way communication can easily be maintained over an 18-20 mile radius. Two-frequency simplex is used, in which the called and calling stations operate on separate frequencies and speak one at a time. The dredgers can only communicate with the shore station and not with each other, but the shore station can speak to all boats at once.

The shore transmitter is normally controlled remotely from the Harbour Master's Office, but during evenings, week-ends and holidays it is switched to the main dock gate police office.

The G.E.C. is represented solely in Australia by the British General Electric Co. Pty. Ltd.

**SHRINK-RESISTANT
WOOL HOSIERY.**

The Standards Association of Australia has prepared Australian Standard Specification No. L1-1949, Shrink-Resistant Wool Hosiery, describing standard methods for determining both relaxation and felting shrinkage and specifying maximum shrinkage limits.

The specification does not attempt to prescribe the particular shrink-proofing treatment to be used. It provides a standard of shrink-resistance which can be applied to wool hosiery irrespective of the type of shrink-proofing process adopted by the hosiery manufacturer.

As a check on over-treatment which may impair the wearing properties of hosiery, the specification includes a "loss of weight" requirement.

Copies of the standard may be purchased from the headquarters of the Standards Association of Australia, Science House, Gloucester and Essex Streets, Sydney, or from any of the Association's branch offices in each State of the Commonwealth and Newcastle, N.S.W.

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Developed as a result of extensive research with plant hormones, the uses of selective herbicides in agriculture and horticulture are rapidly increasing. Australian produced Monsanto 2:4-D is a proved selective herbicide, supplied to compounders either as the soluble Sodium 2:4-D or the insoluble 2:4-D Acid. Sodium 2:4-D, being water soluble, may be used directly, or 2:4-D Acid in combination with some organic amines will give the popular liquid concentrates. A fund of technical information on the use of Monsanto 2:4-D as well as samples, prices and delivery details is readily available on request.

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View from the gallery of one of the many Australian Holdens on view.



Stand of R.V.B. Engineering Products Ltd.

International Motor Show at Melbourne

One Million Pounds' Worth of Exhibits

Featuring exhibits worth over a million pounds, the 1950 International Motor Show held at the Exhibition Building, Melbourne, was opened on April 27 by the Governor of Victoria, Sir Dallas Brooks, in a burst of brilliant summery weather. Illustrating the remarkable progress which has been made in the Automotive field since the end of the war, the Exhibition drew large attendances of technical men and members of the general public, and was a tribute to the attention to detail and co-operative effort of all concerned.

CARS generally were slinkier and offered many more luxury accessories than last year, while a feature was the competitive spirit in the higher priced brackets heralding an imminent return to a buyer's market in this field. Cars in the "popular" price bracket, however, still have long waiting lists, while American cars tend to remain "out of this world" for all but the few thoughtful citizens who placed their names on lists many years ago.

A feature of the Exhibition was the large number of Australian built Holden cars which were on display. Exhibitors of this popular car included Preston Motors Pty. Ltd., Queen's Bridge Motors and Engineering Co. Pty. Ltd., Rhodes Motor Co. Pty. Ltd., and Southern Motors Pty. Ltd.

English and American Ford Cars were exhibited by Melford Motors Pty. Ltd. in the main hall, while a section in the marquee was devoted to Ford Trucks. Cars on view included the V-8 Custom "Pilot" V-8 Saloon, "Prefect" Sedan, "Anglia" Sedan and Tourer, and in the truck section the "Thames" Model 2840 2-tonner, "Ten-Ten" Panel Van, "Ten-Ten" Estate Car, V-8 Coupe Utility and "Prefect" Coupe Utility.

On the stand of Brown & Dureau Limited considerable attention was directed to the new H.R.G. Sports

Car chassis. On racing wheels and possessing an 8:1 compression ration, the H.R.G. may be fitted with Aerodynamic or Monoposto

bodies to special order. Also on view at this stand was the beautiful Lagonda car, the engine of which was designed by W. O. Bent-

ley. This luxury car is available with a Saloon or Drophead Coupe Body.

On the stand of Liberty Motors (Aust.) Pty. Ltd. the well-known Jowett "Javelin" cars were displayed. This car is available in the 1½ litre Saloon Model and the Saloon De Luxe which possesses certain interior refinements.

Among the tractors and agricultural implements on display outside the main building, the tractors built by International Harvester Company of Australia Pty. Ltd. attracted considerable attention along with the farm implements. An Australian production, these tractors are an example of the strides being made in secondary industry in this country to replace implements previously imported.

Working around the upper gallery which featured initial equipment, spare parts replacements, servicing machines, and machine tools of interest to the motorist, garageman, and general engineer, many striking and informative displays were in evidence.

The first stand visited was that of Qualos Sales Pty. Ltd., where the Qualos 4" Junior Lathe, 51" Qualos Lathe and 61" Nuttall Lathe were on view. Providing a range of 4", 51", 61", 81", and 10" Lathes, the Qualos and Nuttall Lathes are in use in machine shops through-



The Governor, Sir Dallas Brooks (right) discussing the motor show with Mr. H. W. Harrison, Secretary of the Chamber of Automotive Industries, and Mr. Stan. H. Earl, Executive Director, A.P.M.A.



A section of the A.P.M.A. Exhibit.

out Australia and enjoy a large export market.

A feature of these machines is the co-operation which exists between the two Companies in supplying and servicing their own and each others equipment in the respective States in which they operate. This service also applies to the Quasol range of hobs which are available in sizes to cut gears up to 20 in diameter.

In the centre of the upper gallery was situated a large Repco display by Replacement Parts Pty. Ltd., the dominating feature being the "Power" Crankshaft Grinder with a Rolls-Royce Merlin Crankshaft turn-between centres.

Other exhibits in this section were the "Power" Double Headed Con Rod Borer which bores from both ends, the Repco Diesel Calibration Test Bench, the Replex Electrical Test Bench for testing generators, starters, distributors, regulators, etc. — while the display cabinets which are made in fabricated sections for building up as units in garages created a great deal of interest among garagemen.

The next display was that of Motor Radiators Pty. Ltd. which showed sections of auto radiators showing various stages of sludge, paint, scale, and dirt deposits which

reduce free flow of water and cause serious overheating in engines. At their premises at 305 Latrobe Street, Melbourne, this Company carries out radiator servicing and repair work.

The E.A. Machin working display featuring New Departure Ball Bearings was a source of interest to many. Ball bearings which emerged through a small hole in the unit bounced onto a piece of metal cut at an angle, jumped through a rotating roller race on to another piece of metal, and leapt into a second hole with uncanny precision.

Here Servian Machine Tools, a cut-away model of a Black & Decker Electric Drill, and a Toronto Electric Fuel Pump pumping red liquid through glass tubing forming the word "Toronto," also added to the attractiveness of the display which included Nasco Hydraulic Jacks and other items of interest to motorists.

An adjoining display featured "Flexy" Car, bus and commercial vehicle washing appliances. These represent a novel application of a sponge washer and brush to the end of a hose which delivers water through the appliance. The continuous flow of water prevents scratching, while the flexibility of



Portion of the A. G. Healing Ltd. exhibit, showing Octopus Test Bench, Brake Drum Lathe and A. C. Sparkplug Tester.

the head ensures that all awkward corners are thoroughly cleaned.

In the exhibit of Pyrox Ltd. of 14-36 Queensberry Street, Carlton, as well as the well-known Pyrox Victor 16 m.m. Sound Projector the new Pyrox Magictape Recorder was on view. With deliveries available in July, this forms an addition to the Model B1 Pyrox Magnetic Wire Recorder used extensively in Radio Recording Studios, etc. Also on view was a Pyrox Electric Clothes Washer and Pyrox Electric Sealed Unit Refrigerator.

A.P.M.A. COURT.

In the A.P.M.A. Court, where member Companies of this Association exhibit, a number of attractive stands were seen. The first visited was one of the three stands of A. G. Healing Ltd. Here a prominent item was a Shock Absorber Testing Machine used by Healings to test their production for correct performance. In operation, a Shock

Absorber is placed in position and when submitted to shock by the machine a needle draws a performance graph on glass which must coincide with a correct performance graph previously inserted under the indicator arm.

Other displays included a Boss Quick Charger, Taper Charger and Super Charger. Swift Cleaner used for cleaning parts laid on a wire screen pumped by an easy working footpump, and a full range of Healing Batteries and Garage Tools.

In the exhibit of the C.B.D. Piston Company of 370 Dryburgh Street, North Melbourne, various cut-away sections of pistons ranging from comparatively small units to heavy industrial machines were shown to illustrate their construction and careful finish.

Associated Power Seals of 200 Bay Street, Port Melbourne, displayed a large diagram of a car surrounded by lights indicating the



The Vice Regal Party inspecting a Ford exhibit.



"Power" Crankshaft Grinder with Rolls-Royce Merlin Crankshaft turning between centres.



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INSTALL A Wedderburn COUNTING SCALE

Counting is easy, accurate and fast when you use a Wedderburn Industrial Counting and Weighing Scale. It can accurately count and weigh thousands of pieces a minute in any multiplication of one unit and in either unknown or predetermined quantities — every component and part from fine hairsprings to sub-assemblies. Many hours are saved per day, errors avoided, wasteful re-handling eliminated. Improved Wedderburn mechanism with exclusive features adds years of service.

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location of the large number of gaskets and packings used in the modern automobile. The foreground of this attractive display featured the many materials which go into the manufacture of gaskets.

The exhibit of the Russell Manufacturing Co. Pty. Ltd. of 81 Burnley Street, Richmond, Vic., featured a display of cylinders and sleeve assemblies attractively mounted under glass. Photographs illustrated casting operations at the foundry and gave an idea of the large staff which is employed constantly in making metallurgical, chemical and physical tests to ensure rigid conformity to specifications at every stage of manufacture.

A feature was the new "U-Flex" oil control ring which has received prominent attention in America and is soon to be placed on the market in Australia.

P. J. Taylor (Newcastle) Pty. Ltd., manufacturers of "P.J." Bearings provided a working exhibit of an automobile motor in which the bearings were given varying degrees of clearance from the correct amount up to .007" extra clearance. Graphically showing were "oil pumping" starts, the engine provided a foreground to a display of "P.J." Bearings which are made to original factory specifications in White Metal, Copper-Lead, Cadmium Alloy and supplied to major car and truck manufacturers.

Diagrams showing the internal construction of Fresco Oil Seals were a feature of the display by Precision Metal Stamping Pty. Ltd. The diagrams, which were effectively drawn and well indexed, illustrated the manner in which the high efficiency of this type of seal is secured.

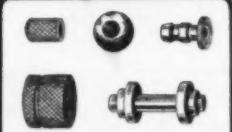
In the Brico exhibit a wide display by Brico Pistons, Piston Rings, Cylinder Liners and Valve Seat Inserts was shown together with cut-away pistons to illustrate internal construction.

W. L. Ryan Pty. Ltd. of 390 Elizabeth Street, Melbourne, provided an exhibit of Ryco Products. Oil filters for Diesel and Engine Oil, and commercial filters for all types of internal combustion engines were on view. Also showing were tools, oil pressure testers, compressometers, valve filters and airline couplings and accessories, and oil filter replacement cartridges for every type of filter.

In the Pyrox exhibit under the aegis of the A.P.M.A., Pyrox Sparkplugs, Emrox Magnets, Pyrox Fuel Injection Equipment, American Bosch 6-cylinder magneto, and A.W.A. radios made for Pyrox were on view. A very informative section was devoted to sectional exhibits of the components of sparkplugs and various equipment.

The Disco Manufacturing Corp. Pty. Ltd. showed a cutaway model of a car distributor working in slow motion to show sparkplugs actually firing. Solenoid switches for dashboard starters and a piece by piece illustration of processes involved in the manufacture of sparkplugs were a feature of this exhibit. Display cabinets which were on view are despatched free

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In the exhibit of G.U.D. products a selective range of Lubricating Oil and Fuel Filters, Stop Leak, Rust Preventative and Radiator Cleaning Compounds, Brazing, Welding and Soldering Fluxes, Grinding and Lapping Compounds, Bearing Blue and Layout Stain, Gasket Cement and Putties, Casein Cement, Car Wash and Polishes, Belt Dressings and Penetrating Oil were shown.

The Pioneer Springs exhibit featured a large replica of the familiar leaping kangaroo insignia which identifies this product. These springs are manufactured in a complete range from the lightest car to the heaviest truck and are fitted as original equipment on many leading English and American Cars.

Under the A.P.M.A. banner, S. Smith & Sons (Australia) Pty. Ltd. provided a fine exhibit of K.L.G. Sparkplugs, while in another part of the building a demonstration of water-tight plugs in operation, speedometers, electric clocks already mounted in car panels, hydraulic jacks and pressure pumps and dial indicators was made.

The highlight of the Fla-seal exhibit was the universal testing machine which is able to duplicate every working condition of seal-pressure, temperature, and shaft speed, and which is used to test portion of every production run. Developed and built to their own design, this machine provides the technical staff with the means for practical research into every phase of oil sealing within their own testing rooms.

Polson Motor Parts Co. Pty. Ltd. displayed a full range of Polson Pistons, Rings, Pins and Liners for cars, motor cycles, trucks, tractors and industrial engines. The makers of "Silver Seal" Piston Rings also demonstrated T Slot, U Slot, Split Skirt, Plain Skirt and Diesel Pistons and Dry and Wet Cylinder Liners.

Under the A.P.M.A. seal, Warren & Brown Pty. Ltd. showed a large range of garage machine and hand tools. Much interest was attracted by a machine which demonstrated by actual test the widely varying tensions which members of the public obtained when attempting to tighten cylinder head nuts to correct amount. In conjunction with this display was shown prototypes of the new Universal Tension Wrench manufactured by Warren & Brown which gives a pre-set guaranteed tension of from 6 to 200 ft. lbs. on any type of spanner which it will hold.



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that has built
over 8,000,000
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H.144.27

Hoover (Australia) Pty. Limited, 60 Clarence Street, Sydney, N.S.W.

Also on view was a woodturning attachment for the Warren & Brown Utility head which is the basis of many machine tools. All who wished, were permitted to try their hand at this fascinating activity and surprising results were

achieved by many amateurs under the practised tutelage of Mr. Ring.

A feature of the Payen, Byrne & Blackford Pty. Ltd. exhibit was the complete sets of gaskets and packings available for popular makes of cars, including Copper and Asbestos Cylinder Head Gaskets, Laminated

Cork Headlamp Strips, Transmission Gasket Sets, Oil Retainer Assortments, Water Pump Repairs Kits, etc.

The stand of A. T. Richardson Pty. Ltd. included a selection of Starter Ring Gears, a Piston Finishing Machine, Con Rod Bor-

BALL AND ROLLER BEARINGS BALL AND ROLLER BEARINGS BALL AND ROLLER BEARINGS BALL AND ROLLER BEARINGS BALL AND ROLLER BEARINGS

The designer's *instinctive choice*

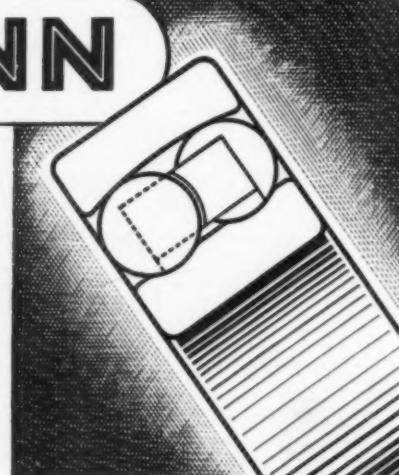
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In this type, self-alignment is provided by the outer race track being ground spherical, the centre of curvature being the centre of the shaft. It is used where there is shaft whip or deflection, but not where there is appreciable axial load. It is supplied in *Light, *Medium and Heavy series and also in an extra wide series.

*These two patterns are also supplied with taper sleeve and nut for adapting to out-of-limits shafts.

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ing Machine with Oil Grooving Attachment, a Universal Fixed Frame Line Borer, Bearing Casting Plate, Con Rod Aligner and Straightener, Direct Reading Micrometers and Pin Returning Tool.

The Replex Electronic Wheel Balancer which was exhibited by Repco Electrics created considerable interest. By using this machine it is possible to balance car wheels without removing them from the car or disturbing the wheel bearing in any way. When it is realised that riding comfort, steering behaviour, tyre wear and safety are largely dependent on accurate wheel balance the value of this easily operated machine is readily apparent.

Keeler Brothers Proprietary Ltd. of Martin Street, Beaumaris, Vic., had on view a wide range of Auto-motive Spare Parts, Grease Nipples, Brass Unions, Attachable Fittings for Flexible Fuel Lines, Starter and Dimmer Switches, etc., which are marketed under the "Zac" trade name.

A display of Ignition Contacts, Condensers and Starter and Generator Brushes was given by Lorimer Contacts Pty. Ltd. A working model illustrated electrical contacts being made at high speed, while figures shown revealed that at 60 m.p.h. distributor arms make 9600 revs per minute. A fine display illustrated the care and precision and carefully tested materials which must go into the making of electric contacts and condensers to

stand up to the continual stresses involved.

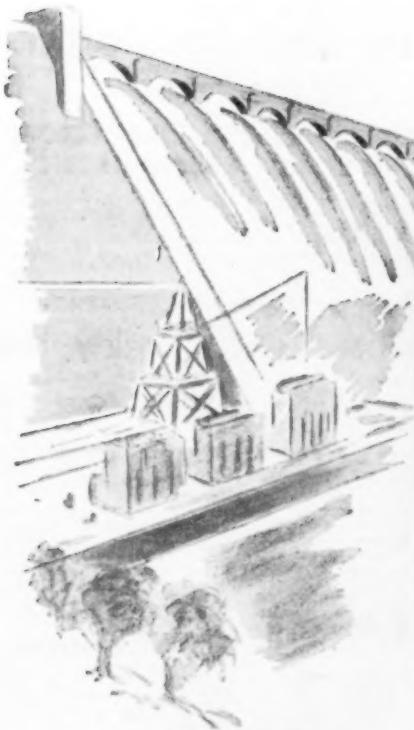
Mackay "Silentruba" Products Pty. Ltd. showed a representative range of the 1200 parts which they manufacture to suit 50 popular makes of cars. Featured were Moulded Radiator Hoses, Body Mountings and Packings, Spark Plug Covers, Battery Splash Cups, Distributor Shrouds, Windscreen Wipers, Tubing, Radiator Cap Washers, Bumper and other Grommets, Drive Couplings, Pedal Pads, Tie Rod Ends, Shackles, Shock Absorber Parts, Axle Bumpers, Gear Lever Knobs, Engine Mountings, Exhaust Pipe Mountings, etc.

The attractive stand of R.V.B. Engineering Products Pty. Ltd. showed a full range of R.V.B. Horns mounted on panels and wired for testing, R.V.B. Pocket and Service Type Tyre Pressure Gauges, "Instant" Airline Couplings and Horn and Headlamp Relays both fused and unfused. Portion of the display was devoted to the recently announced Cylinder Compression Tester which enables engine compression to be tested by removing one sparkplug at a time and inserting the Tester in the sparkplug socket.

Twin, Contra-motion Electric Windscreen Wipers of long arc operating under service conditions drew attention to the large range of products manufactured by H. A. Chivers of 143 King Street, Melbourne. A feature of interest to hard driving motorists was the

(Turn to page 50.)

Your future Source of Supply



VIEW OF SNOWY RIVER.

Photo by courtesy of N.S.W. Dept. of Tourist Activities and Immigration.



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THROUGHOUT THE EMPIRE**

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(Continued from page 48.)

novel Preslite Cigarette Dispenser which automatically dispenses a lighted cigarette when pressed and so obviates the necessity of drivers taking their eyes from the road.

H. P. Morris & Co. of Market Street, Melbourne, displayed the "Marco" range of Water Pump Repair Kits, Petrol Filters, Push Pull Petrol Taps, Air Chucks, Petrol Tap Units, Battery Parts, Gear Lever Knobs, Air Guns, Diaphragm Kits, and Rear View Mirrors. Marco Spinning Type Locking Tank Caps were in evidence as well as a number of non-locking types in various finishes to match popular car shades.

Duly & Hansford Ltd. of Sydney, displayed a full range of "Dufor" bright bolts and nuts, brass bolts and nuts, automotive parts, tools, etc., in an attractive "walk-in-and-
look-out" display.

interesting cutaway sections showing the mass of fittings enclosed in a "Silex" Muffler were a feature of the W. C. Stevens Pty. Ltd. display. Besides showing a range of Exhaust Mufflers to cover a wide range of cars and trucks, a number of exhaust pipes of various sizes and shapes were on view.

Moving out of the A.M.P.A. Court two further sections of A. G. Healing Ltd. exhibits were encountered, the first featuring the Tom Thumb Trailer behind a Fiat car, and the second the New Octopus Test Bench for testing every automotive electrical failure. Also shown on this stand were the A.C. Sparkplug Tester and a very efficient brake drum lathe capable of taking any size brake drum and eliminating the need for small workshops to purchase large and expensive lathes.

for this purpose.

On the Bramec stand were shown samples of Bramec brake and clutch linings in various sizes for every conceivable use. These linings are moulded and hydraulically compressed.

The Norman Harrison Pty. Ltd. stand showed a representative range of products distributed by this firm including Tepco Tools, Tartan Electric Hand Tools, the Lowe Electric Hand Plane, Wandess Boring Bars and Warwick Panel Beating Tools. Other items included Hercules Chrome Vanadium Wheel and Gear Pullers and "K.D." Valve Tools.

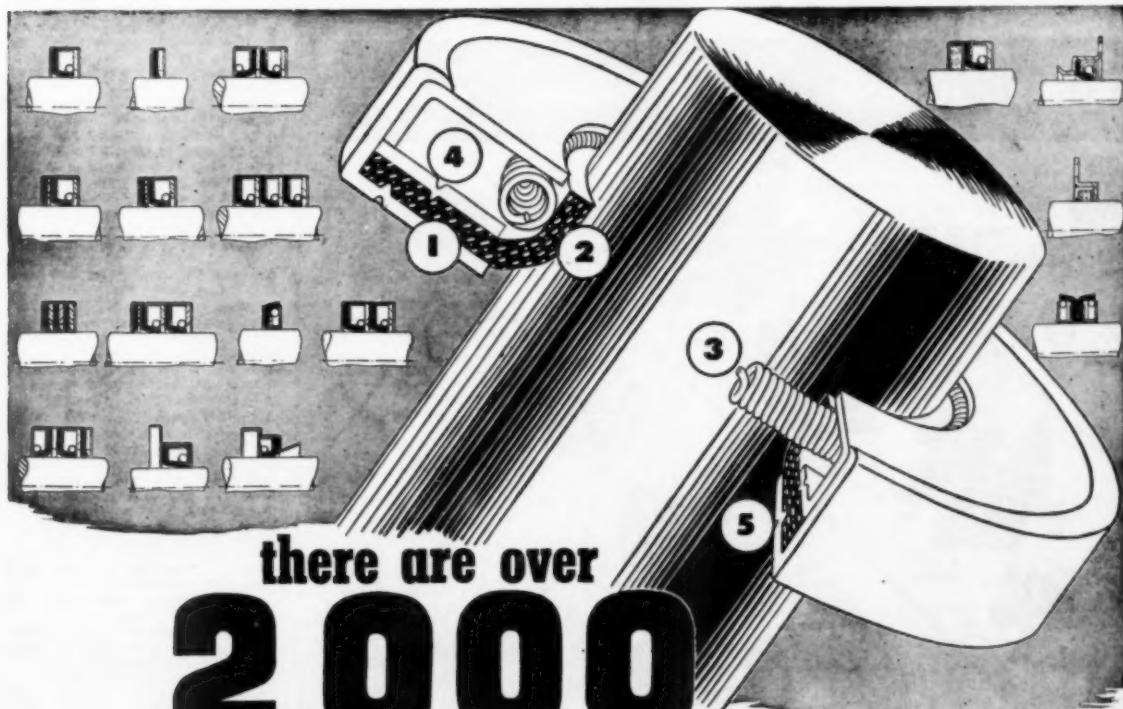
A large display of Ferodo English made Brake and Clutch Linings was featured by A. L. Campbell Pty. Ltd., of 571 Victoria Street, Abbotsford, Victoria, who are specialists in quick service brake and clutch relining work. This Company also supplies sets of linings already drilled for relining brake shoes and clutches for cars and trucks, and linings for industrial purposes, cranes, etc. Fan belts were also on display.

On the Alfred Stewart Pty. Ltd. Stand an attraction was the Demco Sheraton 4" Automatic Cross Feed Precision Screw-Cutting Bench Lathe which features a lever operated horizontal type countershaft drive. Norton Drive, Norton Gear Box for right and left hand threads, and fourway toolpost. Advance Model A.W. Screw-Cutting and Back Geared Engineers' Lathes were shown in operation as well as a number of Advance Drill Presses. Also on view was the Qualex 4" Jumbo Lathe.

Highlight of the Breco Pty. Ltd. Stand was the fascinating exhibition of files straight-from-the-box being drilled with a Delloro-Stellite Drill. Featuring a wide range of precision cast Stellite components and standards, Delloro Stellite Hard-facing Rods, sample brass extrusions from Stellite Dies, the Breco display also exhibited a range of Prolite tungsten-carbide products.

In the Prolite section was a range of Tungsten Carbide Twist Drills, Tipped Spot Face Cutters, Centreless Grinding Blades, Tipped Lathes

(Turn to page 52.)



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SIZES AND TYPES OF THE
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OIL AND GREASE RETAINER

* The Fla-Seal Oil and Grease Retainer is constructed on sound and proven engineering principles to standard pre-determined tolerances in over 2,000 sizes and types for every industrial application. Fla-Seal provides a perfect bearing seal, preventing leakage of the lubricant from the bearing and the passage of foreign matter into the bearing.

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4 The leather seal is prevented from rotating in the casing by projections stamped into the metal case and washer which securely hold the leather in position.

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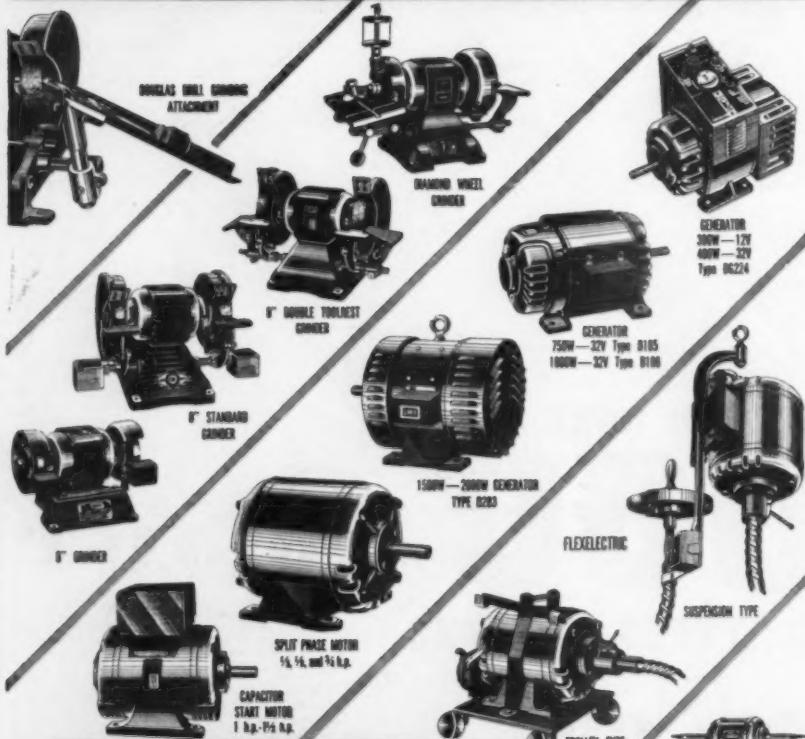


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(Continued from page 50.)

Centres, plain and serrated back milling cutter blades and an interesting solid Tungsten Carbide Insert File. Also on view were Grip Drill Jig Bushes. Available for 1/3rd the price for which they can be made in workshops, these are supplied flanged—or splined for bushing in Bakelite.

On the stand at Atom Distributing Co. of 14 Burwood Road, Burwood, Victoria, a number of Ezycut and Gilbro Machine Tools were in operation making wooden toys which were distributed to passing children. The range of Ezycut machines includes 7" and 12" Bandsaws, 6" and 8" Circular Saw Benches, 15" Throat Jig Saw and the Ezyset Dowel Jig.

Gilbro products include 6" and 4" Buzz Planers on which shavings are carried clear of the machine by a special built-in chute and a short and long Table Bench Model. Also included in this range of machines is the Gilbro 10" Belt Sander.

English made "Fram" Oil Cleaners and replacement cartridges formed a large portion of the exhibit of Simmonds Accessories Pty. Ltd. which showed a large and instructive diagram of the action of these filters. Shortly these replacement cartridges will be made in Australia and at a future date it is hoped to manufacture the complete unit here. Also on show were Simmonds Speed Nuts, Fixes and Clips for which they are sole licensees for Australia.

Glover & Goode Base Metals Pty. Ltd. featured a testing machine, which determines bearing life and behaviour of self-lubricating bearings impregnated with various lubricants, which is used by this Company in research, in connection with Microld Self Lubricating Bearings which are extensively used throughout the Automotive Trade.

Other exhibits in this section included porous bronze metallic filters which will filter, according to grade, 1/10,000th of an inch upwards and are used extensively for filtering petrol, oil, gases, etc. Also on show were ingots of various bearing metals—tin base metals for high-grade work such as Automotive and Aircraft uses, lead base for agricultural machinery, jaw crushers, water pumps, etc.

Other exhibits included type metals containing varying proportions of tin, antimony, and lead for typecasting, lino, stereo or elrod use—solders, score metal for filling scores in castings, Microld Tinall composed of 50 per cent powdered tin and flux which cleans, tins, and solders in one operation, aluminium solder, and the Cerro alloys Cerromatrix for punch and die mounting, Cerrobend for tube bending, and Cerrobase used for Moulding and Electroforming.

At the Red Point Tool Co. Pty. Ltd. stand the range of Sher Electric Tools was exhibited in operation. Manufactured in Australia for over eleven years, this popular range of portable machine tools includes Electric Drills, Polishers, (Turn to page 68.)

Argon-Arc Welding

What It Is: What It Does.

Argon-arc welding is one form of the process more generally known in the country of its origin, America, as inert-gas shielded-arc welding. The idea of welding in an atmosphere of inert-gas is not a new one. As early as 1930 patents were taken out to cover arc-welding processes using protective atmospheres of argon and helium, respectively. The application of inert-gas shielded-arc welding in industry, however, was not introduced until just before the last war when the need arose to find a welding process for magnesium-base alloys which did not require the use of a flux. The available fluxes used in the gas welding of these alloys were very corrosive towards the metal and considerable difficulty was met in removing the flux residues after welding. "Heli-arc" welding provided an answer in that it made it possible to weld the common magnesium alloys without the use of flux, and the process was used extensively in welding these alloys during the war.

IN more recent years there has been a very rapid development of the process, and practical methods have now been established for the inert-gas welding of most of the common metals. The main application of the process industrially has been in welding the austenitic stainless steels, but in America, argon-arc welding will have its greatest use in fabricating aluminium and its alloys.

W. K. B. Marshall, B.Eng., A.I.M., Deputy Director of the British Welding Research Association, in a paper presented to the Association recently, and later published in "The Machinist," points out that in principle the process consists in welding in a virtually inert atmosphere using an arc struck between a non-consumable electrode and the work. The inert atmosphere is provided by directing helium or argon into the weld area via a sheath surrounding the electrode. In the development work in America, both helium and argon have been used, but practice in England has confined itself to argon because of the non-availability of helium. Both carbon and tungsten have been tried as electrode materials, but experience has shown that tungsten is the more satisfactory, and this material is now used almost exclusively, although some authorities claim advantages for carbon in the manual welding of stainless steel. Filler metal is added separately when required, in very

much the same way as in gas welding.

ARC CHARACTERISTICS.

In the simplest case of direct current welding with the tungsten electrode negative, the arc is predominantly thermionic, i.e., the current is carried at the cathode (tungsten) by electrons emitted from the hot tungsten. Such an arc is relatively stable once the tungsten is hot enough to emit electrons. The electrode runs comparatively cool, since following the usual law, less heat is developed at the cathode than at the anode (in this case the work). Very little melting of the tip takes place, and the tungsten electrode should be ground to a fine point.

This arc is a simple melting arc, i.e., it does not have any cleansing action on the metal being welded. For this reason it is suited to the welding of copper-base and nickel-base alloys and certain steels, including in particular stainless steel, but is unsuited to welding aluminium and magnesium. Due to the fact that the greater proportion of the heat is liberated at the anode, the arc gives good penetration. The stability of the arc is reduced by contamination in the form of splashes and spray from the work, and is increased by the presence of the oxides of electro-positive metals, such as calcium, barium, thorium, etc., on the surface of the tungsten or in the arc atmosphere. In the case of direct current with the electrode

positive, the arc is different in character, due, presumably, to the fact that the metals which are normally welded are not appreciably thermionic below their boiling points. The heat generated at the electrode causes a molten ball to appear on the tip and the tungsten is, therefore, consumed at a greater rate than when acting as the negative electrode. There is thus considerable danger of contamination of the work from contact with the molten tungsten. In addition, because of the reduced quantity of heat liberated at the work, penetration is not good. The great advantage of this arc, however, is that for some reason at present not understood it is able to disperse

oxide films on the work, provided the available open-circuit voltage is high enough. For this reason it was originally used in the welding of magnesium and aluminium, although it has now been displaced in this field by the A.C. arc.

To some extent the A.C. arc combines the best of both worlds, in that it gives reasonable penetration with moderate heating of the electrode and is also able to disperse tough oxide films on the metal being welded. At the same time, however, it introduces its own problems, due principally to the fact that the voltage passes through zero at each cycle. When welding metals without a tenacious

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oxide film with ordinary 50-cycle welding current, the arc is able to strike up readily after passing through zero, but in the case of aluminium the oxide tends to prevent the arc from re-striking on passing from the positive half-cycle to the negative half-cycle.

The effect of this is to give less current in the half-cycle on which we depend for cleansing the surface. In the extreme case of complete rectification the arc usually goes out. There is, of course, even under ideal conditions, a difference in the amount of current flowing in the positive and negative half-cycles respectively, due to the different electron emissivity of the aluminium and magnesium, but this is very much exaggerated by the rectification referred to above. Needless to say, rectification has an adverse effect on welding, and, of course, affects the efficiency of the welding transformer.

Rectification may be reduced in a number of ways. By superimposing high-frequency current from an oscillator it is possible to maintain an ionized gap over the period when the voltage is passing through zero, and in this way the arc strikes up on the negative half-cycle. It is important, however, that the high frequency should be correctly phased with the welding current.

Another method of reducing rectification is to use a transformer with a high open-circuit voltage. This provides a reserve of volts to assist the striking of the arc on the negative half-cycle, and also

reduces the time between extinction of the arc and the point at which the re-ignition voltage builds up in the next cycle.

Another remedy which was used in the early stages was to oppose the D.C. component in the arc by means of storage batteries in series with the welding current.

The standard method in modern equipment is to use a high open-circuit voltage with high frequency which starts up the arc and then cuts out. Condensers are normally incorporated in series with the welding current, since these improve the welding and protect the transformer from the D.C. component.

It is interesting at this point to note that although the process of argon-arc welding is referred to as inert-gas shielded-arc welding, the arc is in fact slightly oxidising to an extent varying with the conditions. The argon gas itself, of course, is completely inert, but with low argon flows there is more opportunity for air to diffuse into the gas shield than with high argon flows, and, similarly, a long arc and excessive protrusion of the electrode beyond the nozzle result in increased oxidation.

This oxidising effect may be of some importance, especially where the metal is sensitive to oxide, as, for example, copper. Here, a de-oxidant in the filler rod gives protection against inadvertent oxidation. It may be important also because, as noted above, all types of argon arcs will not disperse oxide



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films, and when rewelding with a simple melting arc, it is advisable to remove mechanically the films left by the previous welding.

Although "Heliarc" welding is only of theoretical interest to us here, because of the non-availability of helium, it is interesting to note that there are slight differences between this process and argon-arc welding. First, helium is a lighter gas than argon, and for this reason a higher rate of flow is required to give the same protection. A second point is that the arc-voltage curve for helium is steeper than that for argon. This means that at a given current the helium arc is hotter than the argon arc and thus gives more penetration, or, alternatively, faster welding. At the same time, it is obvious that a small change in arc length gives correspondingly greater increase in arc heat in the case of helium than in the case of argon, so that heliarc welding offers greater difficulties in manipulation than argon welding. A further result of these differences is that when using electronic methods it is easier to control the arc length with helium than with argon, although satisfactory electronic controls for use in argon-arc welding have been developed.

EQUIPMENT USED.

The simplest form of equipment for argon-arc welding consists of a hand torch, a D.C. generator or A.C. transformer, the necessary leads and the argon pipeline and controls. Essentially the torch consists of a chuck which holds the tungsten and carries the current, surrounded by a hood or nozzle which carries the argon. The tungsten projects slightly from the end of the hood, which is so designed that the argon is directed round the arc on to the work. The argon protects the tungsten, the work and the filler rod from oxidation.

All except the smallest torches are water cooled, since a good deal of heat is conducted up the tungsten into the body of the torch. The hood is normally made of highly refractory ceramic material.

The transformer or generator is similar to standard equipment except that in the case of the transformer the open-circuit voltage should be at least 100 volts if aluminium is to be welded. A high-frequency ionizer consisting of a spark-gap oscillator introduces high frequency in the case of aluminium welding. In addition, for aluminium welding it is desirable to have con-

densers in series with the main welding circuit. A current cut-out which operates in the event of failure of the cooling-water supply is usually incorporated. Argon control is by a reducing valve and a meter which indicates the rate of flow. In more advanced equipment the argon supply to the torch is further controlled by valves which allow the argon to flow for a predetermined time before welding and which cut it off automatically, a predetermined time after the arc has broken. It is necessary to allow the argon to flow for some seconds after breaking the arc in order to prevent oxidation of the hot tungsten electrode.

Where application warrants it, the process can be readily mechanised. The refinements in this case depend on the degree of control required on the job. In some equipment the welding head is mounted on a carriage, and the arc length controlled manually or by means of a small roller riding on the work. In other more elaborate equipment the arc length is controlled electronically.

DESIGN AND TECHNIQUE.

In designing for argon-arc welding, almost the same range of joints is possible as with arc welds in mild steel. The absence of flux makes it possible to use fillet welds with aluminium and its alloys, and thus potentially gives a method of construction cheaper than gas welding where joints are confined mainly to butt welds. There are two limitations, however, to the use of argon-arc welding in these applications. The first is that the joint must normally be accessible to both the torch and the filler rod simultaneously, and, secondly, that overhead welding presents considerable difficulty and should be avoided. Another limitation which applies in the case of some metals in heavier gauges is that in making butt welds a backing plate may be necessary.

The technique in hand argon-arc welding is similar in many ways to that employed in gas welding in that a filler rod is usually necessary, although welds can be made without a filler rod when the fit is sufficiently accurate. Any competent gas or arc welder has no difficulty in mastering the process. In most applications a reasonably short arc is used, and it is important, if consistent penetration is to be obtained, for the arc length to be kept as steady as possible. For

(Turn to page 58.)

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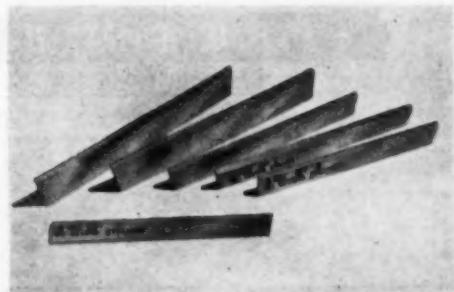
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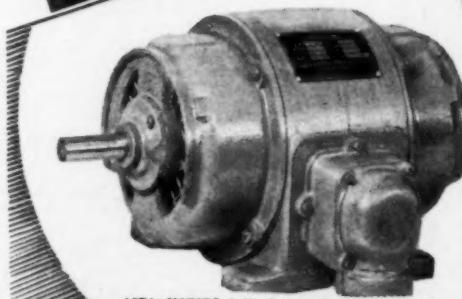
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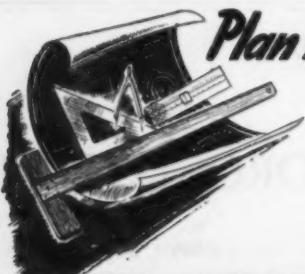
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(Continued from page 58.)

D.C. negative polarity welding the tungsten should be ground to a fine point, but for A.C. welding there is no need to shape the electrode since a hemispherical molten

end forms during welding.

The argon flow should be controlled at the minimum to give good welding, the actual rate of flow depending on the metal, speed of welding and the type of joint.

For instance, in making butt welds in thin-gauge stainless steel a flow rate of about 1½ to 2 litres per minute is adequate. In making similar welds in aluminium, the argon flow will be of the order of 6 to 8 litres per minute. Inside corner fillet welds require less argon than butt welds because of the baffling effect of the work. Outside corners and edge welds require more.

More argon is also required as the speed of welding is increased, although the amount consumed does not increase in linear proportion. It appears to be important in the case of aluminium welding that high-purity argon of the order 99.6 per cent. is used, but for other materials 98 to 99 per cent. argon appears to be satisfactory. Considerable difficulties will be encountered if the argon contains water vapour or the argon circuit is damp.

The electrode size clearly depends on the type and value of the current, but there is insufficient experience at the moment to lay down exact sizes for different currents.

The criterion governing the size of electrodes is the extent to which the tip melts and the consequent consumption of the electrode and contamination of the work which takes place. For a given current D.C. with the electrode negative will give less melting of the tip than with D.C. electrode positive; A.C. will come somewhere in between. It should be noted also that it is possible to employ too thick an electrode for a given current, in so much as this not only makes the welding operation more clumsy, but by causing excessive cooling of the tip it may affect the stability of the arc.

Where possible the work should be laid out so that the welding can be done downhand, although vertical and horizontal-vertical welding is possible in many instances.

The preparation of the work when filler rod is to be used is very similar to that employed for arc welding, although, due to the better penetration possible, square butt preparation can be used for quite a thick sheet. The accuracy of preparation and set-up should be better than for gas welding, since, although a variable gap can be tolerated, the extra time spent on welding such gaps can cause excessive consumption of argon.

Whenever possible, filler metal should be in the form of rod or wire, since the burr left on the guillotined strips interferes with welding. When the use of guillotined strips is unavoidable, burrs should be removed by filing. In all cases except that of stainless steel, filler rods should be cleaned with steel wool prior to using. With certain metals, there is some advantage in cleaning the edges before welding, e.g., aluminium and magnesium, but in most cases the normal mill finish supplemented by degreasing is satisfactory. Tacking is carried out at about the same pitch as for arc welding.

Prior to carrying out welding it is advisable to strike the arc on a scrap piece of metal or carbon block to enable the tungsten to warm up and the arc to become steady. Once a steady condition has been established, the arc is quickly transferred to the work. In some cases it is also an advantage to preheat the work, using an oxy-fuel flame before commencing the welding. This reduces porosity troubles at the start of the weld and assists even penetration. This applies to the heavier gauges of aluminium, copper alloys and nickel alloys.

Although the welding technique itself is quite straightforward, two important points might be mentioned. First, the tungsten must not be allowed to touch the work during welding. In the case

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of stainless steel and copper, the work may be touched in striking the arc, but in the case of aluminium even this is undesirable, and high-frequency starting should be employed. Should the tungsten tip become fouled it should be ground away to clean metal. The second point is that the filler rod should never leave the argon envelope, since the hot tip of the rod will rapidly oxidise in the atmosphere and welding will be adversely affected.

APPLICATION TO VARIOUS METALS.

The application of argon-arc welding to various metals and alloys will now be considered. In considering these applications, what has been said previously regarding the possible oxidising nature of the arc and the difference between the various argon arcs should be borne in mind.

Mild Steel: Argon-arc welding is essentially a process for the more expensive materials, and has, therefore, not been applied to an appreciable extent in the welding of mild steel.

Ordinary rimming mild steel gives porosity when welded with the argon arc, and the quality of the welds is not as good as those made by either gas or arc. Fully killed mild steel can be welded to produce a good-quality weld, although, generally, economics preclude the use of the process for this material. With the development of mechanical welding at high speeds, however, argon arc may eventually compete economically with other methods for repetition work. When welding is to be carried out on steels, D.C. current with the electrode negative gives the best results.

Stainless Steel: The argon arc is eminently suitable for welding the austenitic stainless steels and has been applied to this purpose very widely in industry. The normal technique is to use D.C. with the electrode negative, although A.C. equipment is sometimes employed. Tungsten electrodes are generally used, although it has been claimed that carbon gives a more stable arc in hand welding. So far the thinner gauges ($\frac{1}{16}$ in. and thinner) have received most attention, since the narrow heat bead which is possible with argon arc reduces the time taken in the grinding and polishing which is carried out on these gauges. Control of penetration is easier with the argon arc than with the metal arc, which makes it possible to weld from one side sheet which would normally be welded on both sides when using metal arc. The use of mechanised equipment results in further improvements in this direction. With very thin metal, where the argon-arc process replaces gas welding, the distortion is very much less and finishing costs are consequently reduced.

The strength of welds made using the argon arc is good, and approximately equal to that of the parent metal. Moreover, the cor-

(Turn to page 81.)

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(Continued from page 59.)
rosion resistance of the welds is excellent, provided, of course, the appropriate filler rod is used.

One incidental advantage of the argon-arc process in this class of material is that it enables good-quality welds to be produced in the various new alloys when metal-arc electrodes are not available.

Industrially, argon-arc welding has been used in the fabrication of a wide range of light-gauge tanks and similar equipment for the chemical and food industries. In most cases, the welding has been carried out by the hand torch, replacing metal-arc and oxyacetylene welding.

An interesting example of such an application is in tipping tanks for the dairy industry in 14 s.w.g. titanium-stabilised 18/8 steel. The welding was carried out from the outside, using an uncooled torch and columbium-stabilised filler wire. In the case of metal-arc welding it was necessary to make a run on each side of the weld, but with argon-arc welding the penetration was sufficiently consistent to allow welding from one side only. Moreover, the smoothness of the weld bead reduced considerably the grinding necessary in finishing the weld. The welding speed was slightly slower than a single run of the metal-arc weld.

Further instances where manual argon-arc welding has shown advantage over metal-arc and gas welding are in the construction of light-gauge buckets, churns and domestic sinks.

In certain cases, the repetitive nature of the work has enabled mechanical argon-arc welding to be employed with further reduction in costs and improvement in quality. Pipelines and churns for the dairy industry, and buckets for the food industry, are examples of where this has been achieved.

An important application of mechanical welding has been in the replacement of atomic-hydro-

gen welding in the fabrication of tubes from strip. Here, welding speeds of many feet per minute have been reported, with extraordinary consistency in the welds.

Aluminium and its Alloys: With the introduction of A.C. welding using open-circuit voltages and superimposed high-frequency current, aluminium and some of its alloys are now weldable by argon arc.

As noted earlier, the article continues, any type of joint may be used, since there are none of the troubles which arise from the use of fluxes. Further, because of the absence of fluxes, site welding becomes very much simpler.

With present technique, it is possible to weld up to $\frac{1}{8}$ in. thick aluminium from one side without a backing plate. Above this thickness a backing plate is required if welds are to be produced from one side, or, alternatively, two runs may be employed, one on each side of the plate. For heavier sections it is necessary to preheat the work at the start of the weld to a temperature of 100 to 200 deg. C., in order to ensure freedom from porosity and to obtain an even penetration. It is reported from America that 2 in. thick material has been welded, using a multi-run technique, but for economical welding of thicknesses of this order, considerably heavier torches than are at present available will be required.

All the alloys which are considered weldable by oxy-acetylene may be welded, using the argon arc, with much less distortion than arises in oxy-acetylene welding. There is, moreover, a tendency to extend the process to the medium-strength heat-treatable alloys such as that containing 1 per cent. magnesium, 1 per cent. silicon.

Alloys containing magnesium tend to show a dirty top surface, but this does not appear to be of consequence. The strength in all cases appears to be at least equal

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to that obtained in oxy-acetylene welds.

There is little doubt that the introduction of argon-arc welding to aluminium and its alloys has opened up many new fields of application for these alloys, particularly in structures.

So far, extensive industrial application of argon-arc welding has been carried very much further in the United States than in the U.K. This has been due mainly to the shortage of suitable equipment and the high cost of argon-gas in England, but both these points are now receiving active attention.

In the United States, argon-arc welding has been used in place of oxy-acetylene welding in the construction of large tanks in pure aluminium and aluminium-manganese alloy for the chemical and oil industries.

The thicknesses which have been handled industrially vary between 22 s.w.g. and 1 in. In most cases the welding has been done manually using filler rod, but in the case of beer barrels and other small containers it has been possible to mechanise the process with considerable economic advantage. In England, it appears that applications have so far been confined to the manual welding of small vessels in pure aluminium and 5 per cent. magnesium alloy, and the mechanical welding of light aluminium-alloy sections.

Magnesium and its Alloys: As noted earlier, argon-arc welding was originally introduced specifically for welding magnesium, and in America it has now superseded all other forms of welding for this alloy. While some welding is still carried out using D.C. current with the electrode positive, the general practice now is to weld these alloys using the same equipment as that employed for aluminium. With argon-arc welding the old troubles with flux inclusions which so restricted the further application of welding with these alloys has dis-

appeared, and magnesium has been able to enter the field of welded structures.

Copper and its Alloys: In the case of pure copper, argon-arc welding has not been too successful. The normal practice is to use direct current with the electrode negative, and to supply additional heat at the start of welding from an oxy-acetylene flame. The oxidising character of the arc makes it desirable to use a filler rod containing deoxidising elements such as silicon, phosphorus or tin. In the practical application of the process, difficulty arises due to the high conductivity of copper, and, in addition, the welds tend to be porous. Strength figures are no better than those obtained using oxy-acetylene welding, and this, together with the manipulation difficulties, limits the use of the process. It may find some application where freedom from distortion is a prime consideration.

Copper alloys can be satisfactorily welded, since their conductivity is lower and they usually contain deoxidising elements.

Industrial examples of the application of argon-arc welding to copper and its alloys come mainly from the United States. Tanks for the chemical industry in pure copper up to $\frac{1}{2}$ in. thick have been welded using copper-tin-phosphorus alloy as filler rod. Rotors of small electric motors have also been welded.

Nickel and its Alloys: Nickel and its alloys are usually welded using direct current with negative polarity on the tungsten. With pure nickel and Monel, trouble is encountered from porosity, and it has been suggested that continuous preheating is necessary to overcome this.

Inconel, Nichrome and Nimonic give good welds of satisfactory strength.

Industrially, argon-arc welding does not appear to have been applied extensively for welding nickel

(Turn to page 75.)

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PATENT & TRADE MARK NEWS

Complete specifications lodged with the Patents Office are open to public inspection almost immediately after their lodgment. Interested persons are now able to obtain the details of an invention for which protection is being sought.

Provision is also made (Patents Act, 1946) for an applicant to obtain damages, if infringement occurs, from the date of publication of the application. A rule of practice has been established whereby an application will be examined more speedily when a *prima facie* case of alleged infringement is proved.

Particulars of the necessary procedure will be supplied by any Patent Attorney practising in the Commonwealth.

PATENT SPECIFICATIONS ACCEPTED

MACHINE FOR DRYING FIBROUS SHEETS OR BOARDS.

136,917.—D. Avery and J. Avery, Vic. The material is subjected to continuous pressure to extrude the liquid content whilst simultaneously an alternating current of electricity is passed through said material. Preferably the boards are treated in multiple by a three-phase current fed thereto by electrodes, whilst alternate electrodes are connected to a common neutral point.

A SELF-OILING PUMPING HEAD

136,926.—C. P. Jessop, Qld. To facilitate lubrication a pump head comprises a casing containing oil and mounted upon a base, a shaft with a boss and toothed wheel mounted thereon,

an eccentric integral with the wheel, a driving pinion on a countershaft, a strap about the eccentric having an eyeiece, a lever provided with a pin rotatably held in the said eye-piece and at its other end provided with a boss freely mounted on a shaft, said boss being integral with a sole plate for attachment to a mechanism, having vertical parallel motion for reciprocating a pump rod.

The pumping head may be provided with a counter-weighted walking beam having a head in rolling contact with the straight end of the said pump rod and held thereto by wire ropes. A lubricating plunger pump is actuated by the eccentric strap.

EXPENDABLE MINCING MA- CHINE PLATES.

136,928.—K. W. Nolan, W.A. To provide for greater durability and economy of operation, a cutting plate holder is provided

with a recess adapted to act as a backing for a flat expendable mincer cutting plate. In one form of the invention, holes in the plate holder and the cutting plate register with each other.

In one modification, the holes are replaced in the plate holder by supporting ribs that centrally carry the boss as a bearing for the mincer stud and are spaced to miss the holes in the mincer plate; while in a further modification the cutting plate may be elongated and fed transversely through the mincing machine to allow for ready exposure of the worn parts to the mincing knife.

BURNER NOZZLE STRUCTURE WITH TAPERED GROOVES.

136,933.—Standard Telephones and Cables Pty. Ltd., N.S.W.

To produce a hollow substantially cylindrical flame a burner nozzle head encloses and supports an inner member of frustoconi-

cal formation having tapered longitudinal grooves which form with the internal conical surface of the outer member downwardly and inwardly inclined passages for the fuel gas. The inner member has a terminal clearance recess with a flared opening to centre the burner nozzle in relation to the metal cap. The burner nozzle supporting member being water cooled by an arrangement of pipes.

Patents, Designs, Trade Marks and Copyrights of all Countries

FREDERICK B. RICE
Ing. Dipl. — Fellow, Inst. Pat. Att's Aust.

Club Chambers, 96 Phillip Street, Sydney, N.S.W. Tel: BW 9318.

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AN INSULATED FOOD GRILLER.

136,935.—R. G. Tugen, Vic.

An insulated housing with one or more heating elements disposed on either side has a detachable perforated trough-like top enclosure, disposed centrally thereon and above and in close relationship to a grilling compartment to support fats that when heated drip down on to the food supported in an upright position by the hooks of the gauge beneath which is a drip tray. In a modification a plurality of grilling compartments are provided. In a further modification the sides are adapted to hinge outwardly into a horizontal position.

VIBRATORY SCREENING APPARATUS.

136,940.—J. C. Schmidt, S.A.

To provide a more economical and efficient resilient support for a vibratory screening machine, the body is supported from a base frame through rubber or like members bonded to plates each having one end attached to the frame and extending laterally to the screen body, the opposite end being also secured to the screen body so that it is suspended by the members in shear.

REFRIGERATOR COMPRESSOR-MOTOR SUSPENSION.

136,943.—T. D. Cash, M. G. Cash and J. B. Cash, Vic.

In a refrigerator, a motor and compressor assembly is resiliently mounted on a support which comprises a platform, a number of springs located below and interposed between the platform and the frame of the refrigerator, at least one buffer spring located above the platform coaxially with one of the springs and means whereby the springs and the buffer spring are flexibly connected to the platform and to the frame so as to permit limited universal movement of the springs responsive to the vibration of the platform.

NEW IMPROVED PAPER ROLL HOLDER.

136,947.—The British Australian Paper Co. Pty. Ltd., Vic.

In a toilet paper roll holder having a weight controlled spindle on

which the roll is mounted and limited to a partial rotation, provision is made for a spindle having flanges at each end journalled in the frame of the holder and a parallelly disposed adjustable member between the flanges and connected to the fixed member of the spindle for relative lateral movement to permit variation or adjustment of the distance between the fixed and movable members to attain a force fit of the spindle in the bore of the roll.

A DEVICE FOR DISPENSING LIQUIDS.

136,948.—H. O. Kimpton and G. W. Godfrey, Vic.

To clean a tap a body member with an open ended unobstructed passage has a valve member and a seating, actuated by means and operative connections which are located externally of the passage way when the valve member is on its seating.

LIQUID FUEL HEATING DEVICE.

136,960.—B.D.H. Industries Ltd., S.A.

A copper, using liquid fuel, has a main combustion chamber having an outlet flue and a main channel communicating therewith through an opening. A series of perforated plates in the channel allow the flow of a predetermined quantity of air. An auxiliary air inlet duct is located between the plates and the chamber to allow air to by-pass the plates. Combustible fluid is fed to the plates through a pipe, and the heat in the plates causes vaporization of the fuel to allow of combustion of the gas in the chamber. The arrangement of the plates is such that each successive plate is raised to a higher temperature.

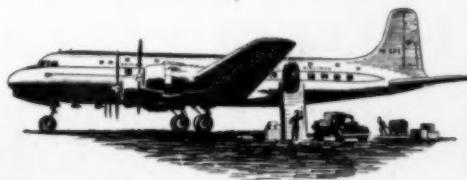
AN ELECTRIC DRIER FOR CLOTHES.

136,972.—A. M. Wheeler and J. J. West, Vic.

An electrically heated drier comprises one or more electric heating elements disposed in the base of a cabinet provided with means for supporting clothes or the like in a space above the elements and having double walls in the vicinity of the elements providing passage ways for the

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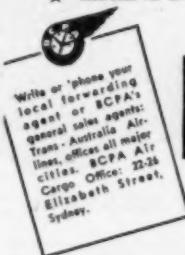
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In a modification the apparatus may be used as a room heater and thermostatic controls may be employed.

NEW TYPE SPRAY NOZZLE.

136,975.—R. E. Williams, N.S.W.

A spray nozzle for horticultural use comprises an internally screw-threaded casing which has a conical chamber with a spray outlet and which receives an adjustable spray forming plug, centrally orificed to communicate with radial passages extending to an annular space, from which grooves cut in the plug, communicate with the conical chamber.

CONCRETE TEE BEAMS FOR CELLULAR FLOORS.

136,979.—E. P. Henshaw, W.A.

To reduce the constructional weight of concrete tee beams for use in cellular floors, the concrete is apportioned to areas of the beam in compression according to a stated scale of ratios between all components in the beam. The concrete is apportioned as indicated to the upper part at mid span to the lower part of the supports, such accretion of concrete diminishing in a flaring like manner from the point of maximum moment at the support to the point of contraflexure.

HANDLES FOR WATER TAPS.

136,991.—Draffin Bros. Pty. Vic.

A die cast main body adapted for application to a tap spindle has a number of pins outstanding radially therefrom, and sleeves or hollow cone like members moulded from plastic material which are force fits around said pins and are substantially permanently secured thereto.

TRADE MARK APPLICATIONS

91,265. "Gerrard." Bands and containers for strapping machines.—Gerrard Wire Tying Machines Company Proprietary Limited, 18-24 Ireland Street, West Melbourne, Victoria.

95,083. "Sidco." Locks, including padlocks.—R. Siddons Proprietary Limited, 77a Spensley Street, Clifton Hill, Victoria.

95,298. "Niphon." Electrical plug and socket couplings, etc.—Simmonds and Stokes Limited, Victoria House, Southampton Row, London, England.

95,454. "Permomatt." Paints and enamels.—Glazebrooks Limited, Tyseley Paint and Varnish Works, James Road, Tyseley, Birmingham, England.

95,455. "Plasglaze." Paints and varnishes.—Glazebrooks Limited, Tyseley Paint and Varnish Works, James Road, Tyseley, Birmingham, England.

95,621. "Tervan." Wax used in manufacture.—Atlantic Union Oil Company Limited, 60 Pitt Street, Sydney, N.S.W.

94,650. "President." Clothes washing, springing and drying

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machines, etc.—President Products Pty. Ltd., Hardy's Chambers, De Mestre Place, Sydney, N.S.W.

94,104. "Pesco." Pumps, especially pumps used on aircraft.—Borg-Warner Corporation, 310 South Michigan Avenue, Chicago, Illinois, U.S.A.

94,673. A label design showing, inter alia, the word "Gerrard." Tensional strapping machines and their parts.—Gerrard Wire Tying Machines Company Proprietary Limited, 18-24 Ireland Street, West Melbourne, Victoria.

85,389. "Adder." Aeroplane engines and parts.—Armstrong, Siddeley Motors Limited, Park Side, Coventry, Warwickshire, England.

95,609. "Conquip." Tractors, earth-moving machinery and equipment.—Camden Constructions Pty. Limited, Argyle Street, Camden, N.S.W.

CHANGES IN ARBITRATION SYSTEM?

According to recent reports, important changes in Australia's arbitration system may be made later in the year. As a matter of fact, the Prime Minister, Mr. Menzies, already has announced that the Government is engaged in a comprehensive study of existing industrial legislation to decide whether or not it should

be re-adjusted. It also is reported that the Arbitration Court and other authorities have drawn attention to a number of weaknesses, notably the lack of a rigid common rule as between individual Conciliation Commissioners.

No decisions will be reached, however, until the whole question has been examined thoroughly.

TENDERS FOR PATENTS

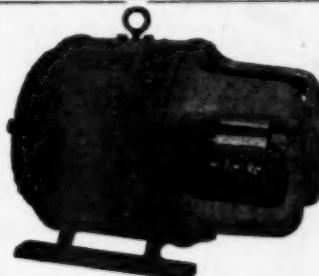
GEORGE HANCOCK REID, the proprietor of Australian Patent No. 129,420 for "Improvements in or relating to Combined Rate of Turn and Bank and like Indicators, particularly for Aircraft", invites enquiries from persons interested in manufacturing or using the patented invention in Australia under licence or other arrangement. Address enquiries to A. WALLACE SMITH, Patent Attorney, 358 Collins Street, Melbourne.

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NOTICE is hereby given that the owner of Australian Letters Patent No. 122,042, dated 16th June, 1944, is desirous of disposing of the rights in this invention by way of licence.

Further particulars will be supplied on application to

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Protective Apparatus (Sch. C. 5592), £8,567/14/2. Ogden Industries Pty. Ltd.

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Protective Apparatus (Sch. C. 5592), £22,962/10/-. Phoenix Telephone & Electric Works Ltd.

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One Verge Cutter Mower. Levin and Co. Ltd., £275.

One Mowall Machine, with Hydraulic Lift Attachment. Scott, Bonnar (Vic.) Pty. Ltd., £1,082.

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Envelopes, for X-Ray Films (A.R. 628). Watson, Victor Ltd., £274/10/-.

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R.A.A.F. Ensigns (File No. C-4/202/11). Harry West, £125.

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Men's White Handkerchiefs (File No. C-4/233/18). Pioneer Distributors Pty. Ltd., £1,617/9/6.

Football Jerseys (File No. C-4/255/18). Jason Knitting Mills, £471/13/2.

Football Stockings (File No. C-4/255/18). William Graham Pty. Ltd., £123.

White Cotton Duck (File No. C-4/258/68). Davies Coop (Flax Industries) Pty. Ltd., £313/19/-.

Grey Blankets (File No. C-4/259/34). Morris Woollen Mills (Ipswich) Pty. Ltd., £16,575.

Prefabricated Spray Booths (File No. C-4/302/94). L. J. Budde & Co., £1,296.

Aluminium Jugs (Req. No. 2572). Crusader Plate Co. Pty. Ltd., £313/4/-.

Ingots (Req. No. 2732). Melbourne Iron & Steel Mills Pty. Ltd., £660.

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Auxiliary Fuel Tanks (Req. No. 2814). J. R. Lee, £440.

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Spirit Levels (Req. No. 2886). Johnson & Gaston Pty. Ltd., £265/6/8.

Brown Coal (Req. No. 2896). Gardiner & Warner Pty. Ltd., £1,375.

Spare Parts, Stop Watches (Req. No. 2898). Prouds Ltd., £380.

Food Containers (Req. No. 410). H. & H. Hardware Pty. Ltd., £217/17/6.

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(Turn to page 75.)

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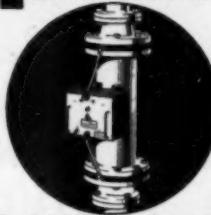
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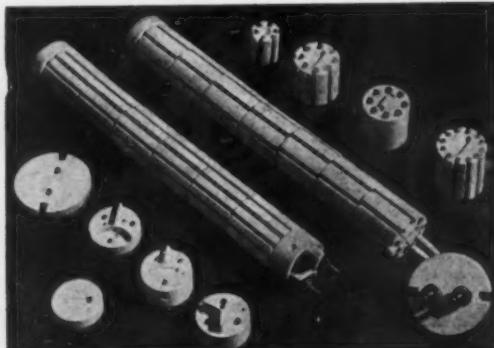
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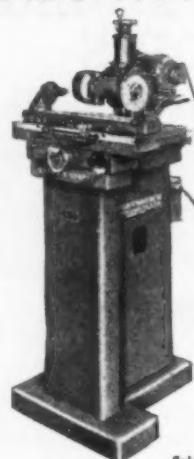
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(Continued from page T2.)

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Waterproof Overcoats and Pull-ons (Sch. 211). Bak Raincoat Co. Pty. Ltd. Rates.

Argon-Arc Welding

(Continued from page 62.)

and Monel, but reports from the United States show that the pro-

cess has been successfully used for welding thick Inconel for the chemical industry.

In England, the argon-arc has been used for the welding of Nimonic for furnaces and jet engines.

CHOICE OF EQUIPMENT.

The various factors governing the choice of argon-arc welding equipment for a particular metal or application may be summarised. Where the metal does not form a tenacious skin when molten, direct current with negative polarity gives best welding. Where a tenacious oxide-film is formed, alternating current with an open-circuit voltage of at least 100 volts is required, together, in some cases, with high-frequency stabilisation of the arc and condensers in the welding circuit. Again, where the metal to be welded has a high conductivity, other things being equal, the use of direct current with negative polarity on the electrode gives the best chance of success. Finally, when easy starting without contact between the work and the electrode is required, a superimposed high-frequency current provides the answer, even though this is

switched off immediately the arc is struck.

ECONOMICS.

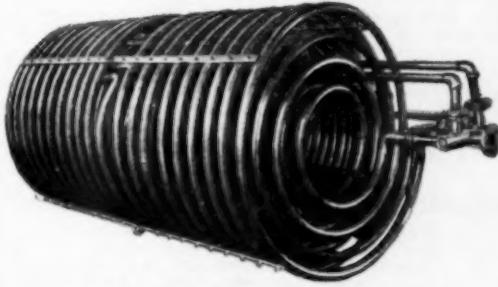
The economics of argon-arc welding compared with other methods of welding depend on many factors. First, since the most expensive item is the argon gas, any measures which reduce the consumption of argon per foot run of weld are worth while. It should be noted that in argon-arc welding, welding speed has a bigger effect on costs than in any other form of welding, and for this reason operators should be encouraged to weld as fast as possible, commensurate with obtaining adequate quality.

Furthermore, very careful control of the argon supply should be maintained, and in this connection relays which turn on the argon a given time before it is desired to commence welding and automatically stop the flow a predetermined time after the arc is broken, very soon pay for themselves in terms of argon saved. It is also very important to maintain the argon pipeline in good condition and check frequently for leaks.

Assuming that attention is paid to these points, the cost of argon-

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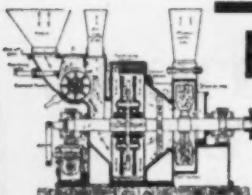
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arc welding compares favourably with that of competitive forms of welding in many applications. For instance, in welding thin-gauge stainless steel, the cost of welding, using the manual argon arc, is slightly higher than that of metal-arc on 18 and 20 g., but appreciably cheaper on 12 and 14 g., where welds may be made in one run instead of the usual two.

In the case of aluminium, the argon-arc process is more expensive than the traditional oxy-acetylene process for general shop work, but here the "imponderables" may be important, since there is no trouble with flux, and site welding is safer. On existing prices, the cost of argon-arc welding is also slightly higher than that of metal-arc welding of aluminium, but here again it permits forms of construction which would involve considerable risk of flux corrosion if metal-arc welding were used.

With the more expensive materials, such as the nickel-base alloys, the quality of the welding is of greater importance than the cost. If a comparison of costs is required it will be found that the position is similar to that stated for 18/8 stainless steel.



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NEW DEVELOPMENTS.

mention should be made of two developments of the process which have taken place in the United States. The first of these has been called "poke" welding, and consists of a form of plug welding in which two overlapping sheets are welded together by melting through from one side using the argon-arc. The equipment consists of a gun holding the tungsten rod surrounded by a sheath in such a way that when the end of the sheath is pressed against the work the tip of the tungsten is at the required distance from the work. Argon flows through the sheath, round the rod, and issues at vents where the sheath touches the work. The arc is initiated by means of a high-frequency supply, and its duration is controlled by a timer. Once the conditions are established, it is possible to produce good, strong plug welds with very little depression at the outer surface. The process has been applied to all materials, including mild steel and aluminium, and has found considerable application where the equivalent of a spot weld is required from one side of the work.

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(5) The argon-arc process often gives an improvement in the quality of welds in certain difficult materials. In particular, weld cracking is less likely to occur than in gas welding.

(6) Argon-arc welding provides a method of welding new materials.

is more pronounced than with gas welding.

(5) The continuous use of high-frequency current gives considerable radio interference, but the development of special high-voltage transformers and valve oscillators may eliminate this.

It can be appreciated, therefore, that argon-arc welding is not the panacea for all welding problems. Each case must be considered on its merits, and, with further experience, the proper field for this form of welding will become more clearly defined. There is little

doubt, however, that the further extension of argon-arc welding will depend more than anything else on the ability of the producers to reduce the price of gas, and to a lesser extent on an increase in the capacity of the welding equipment already available.

DISADVANTAGES.

(1) Without proper care in the control and use of gas, argon-arc welding can be expensive.

(2) Accessibility of the joint is reduced compared with metal-arc welding.

(3) When argon-arc welding is carried out in the open air, considerable precautions have to be taken to reduce draughts. It is conceivable that on windy days welding might become very difficult indeed in some instances.

(4) In the case of some materials, notably aluminium, the under bead

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CURRENT TENDERS

NEW TENDERS

The following tenders have been called since our last issue. Current tenders which have been published in previous issues follow this section.

COMMONWEALTH

POSTMASTER-GENERAL'S DEPARTMENT.

Accumulator Plates and Separators (Sch. C.6318). June 13.

Cable and Carrier Cable Systems (Sch. C.6304). July 4.

Faders and Gain Controls (Sch. C.6315). June 8.

Lead Sealers and Parts (Sch. C.6170). Aug. 3.

Microphone, Stands, and Cable (Sch. C.6316). Aug. 1.

Pipe Bushes and Ferrules (Sch. C.6321). June 6.

Printed Forms, "T.G." Series (Sch. C.6322). June 1.

Printed Publicity Matter (Sch. C.6329). June 6.

Public Address Systems (Sch. C.6317). June 8.

Ringing Equipment (Sch. C.6311). Aug. 1.

Transfers (Sch. C.6310). June 13.

Steel Castings. May 30.
Test Benches, Automotive Electrical. May 30.

GOVERNMENT RAILWAYS DEPARTMENT.

Steel Superheater Elements, for Locomotives. May 30.

DEPARTMENT OF SUPPLY AND DEVELOPMENT.

Airborne Spares, Pumps, Motors. Purchase of. May 26.

Capes, Waterproof. May 26.

Hospital Counterpanes. May 30.

Mattresses and Pillows. May 25.

S.S. Bars and Billets, Purchase of. May 26.

Spraying Solutions, D.D.T. May 26.

STATES

NEW SOUTH WALES

GOVERNMENT RAILWAYS DEPARTMENT.

Battery of 60 cells, positive and negative plates (Sch. CE-1959). May 22.

Mechanical Soil Compactor (Sch. CE-2694). May 26.

(Turn to page 79.)

NICHROME RESISTANCE WIRE THE WORLD'S BEST

Made in England

SOLE AUSTRALIAN AGENTS :

WARMAN & DOUGLAS
241 FLINDERS LANE, MELBOURNE.

Phone: JM 1568.

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GUILLOTTINES — 3, 4, 6, 8 and 10ft. Models.

CRAMP FOLDERS — 3, 6 and 8ft. Models.

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ROLLERS — 3ft. and 6ft. Sets.

ALSO MOTORISED DRILLING MACHINES

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THE UNSURPASSED
TOOL METAL
WOODWORKING & ENGINEERING
SUPPLIES PTY. LTD.
127 WILLIAM STREET, MELBOURNE. MB 2741.

NEW TENDERS — Contd.

Motor Suspension Bearings
(Sch. CE-2700). May 28.

DEPARTMENT OF MAIN ROADS.

Cast Brass Nameplates. May 30.
Concrete Pipes. May 23.
Fuel Injection Pump. May 30.
Iron Fittings. May 25.
Mechanical Ditching Machine.
May 30.
Road Brooms, Pneumatic
Tyred. May 25.
Spanners. May 23.

* * SEE ALSO * *
"LATE OPEN TENDERS"

Stationary Air Compressors. May 30.

MARITIME SERVICES BOARD.
Steel Storage Equipment. May 22.

SYDNEY COUNTY COUNCIL.

Ironclad Service Cut Outs
(2,000), 25 amp. May 23.
Lamination Iron (10 tons). June 1.
Low Voltage Cables, varnished
cambric Insulated (Spec. 1412).
June 15.

Paper Insulated Lead Covered
Cable, high and low voltage
(Spec. 1414). June 15.

Paving Bricks (120,000), "Electric".
May 31.

Substation Relay Group Equipment,
for City A.C. Network Sig-

nal Equipment (Spec. 1408). Aug.
17.

Terminating Boxes, with Covers
(3,000). May 31.

MISCELLANEOUS.

Diesel Powered Road Rollers
(2), 6/8 tons, for Municipality of
Canterbury. June 5.

Electrical Accessories:—Hard
drawn bare copper conductor; Insulators,
Insulator Ironwork and
sundry Ironwork fittings; Trans-
formers, single and three-phase,
for Namoi Shire Council. June 5.

Items of Equipment:—Motor
Patrol Grader: Heavy Duty Patrol
Grader, Tandem, or 4-wheel Drive,
fitted with Scarifier and 13 ft.
Blade, powered by an engine of
at least 60 H.P.; Tractor: Crawler
Tractor of approx. 40 H.P. capac-
ity, suitable for use with Power
Control Unit and Angledozer.
Tenders are invited to tender
separately for a P.C.U. and Ang-
ledozer, suitable for the machine
they propose to supply; Air Com-
pressor: Portable Air Compressor
of the Trailer Type, fitted with
pneumatic tyres, having a capac-
ity of approx. 100 cu. ft. of free
air per minute and operating
pressure of 100 lb. per sq. inch;
Bitumen Sprayer: Trailer type
Bitumen Sprayer of capacity of
between 300 and 500 gallons, fitted
with Spray Bar, power-driven
pump and heating unit, for Tumut
Shire Council. June 5.

Motor Grader, medium type, for
Shire of Manning. June 9.

Power Grader, approx. 8-10,000
lbs. for Municipality of Liverpool.
Extended to June 6.

Switchgear, truck type (11,000
v.), for Shire of Blacktown. July 4.

Tractor, crawler track type,
with Diesel engine and power
control unit, for Canobolas Shire
Council. June 7.

**CHEMICALS—DRY COLOURS,
RAW MATERIALS FOR
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POWDERS & METALS**

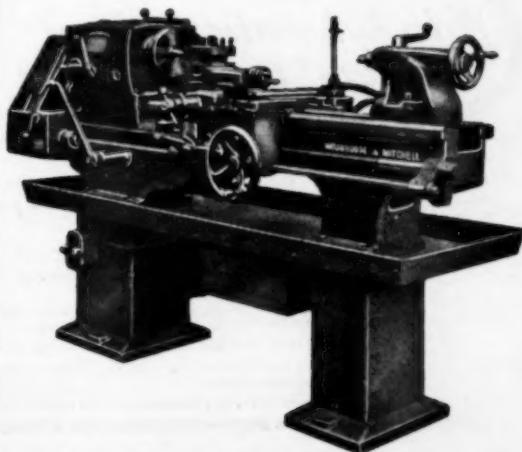
VICTORIA

**GOVERNMENT RAILWAYS
DEPARTMENT.**

Engraving Machine. June 14.
Grinding Machines, double-
ended. June 14.
Universal Milling Machinery.
June 14.

(Turn to page 80.)

wm —
70 JUNIOR
**7" S.S. & Sc.
LATHES**



- Diagonally braced box section bed for rigidity and strength
- Heat-treated nickel steel gears on multi-splined shafts
- Toughened main spindle, tubular forged, high carbon steel
- Single lever selection of sliding and surfacing feeds
- Inverted vee and flat guides for saddle and tailstock
- Tension mounted lead screw with ball thrust bearings
- Oil-immersed multi-plate clutch
- Built throughout to Schlesinger limits

The illustration above shows the clean lines and accessibility of all controls. From gear box to tail stock the WM70 JUNIOR is essentially a practical job, designed and built to provide accuracy, reliability and simplicity of operation. Standard bed length gives 36in. between centres, but a longer bed giving 45in. is available if desired. Head stock provides 8 spindle speeds ranging from 30 to 437 r.p.m. Gear box giving 3 feed speeds is standard, but Norton type quick change box is alternatively available.



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Telegrams: "CLEVCO," Redfern

The NEW
"O.J.-30"
D-O-L STARTER

With Automatic Ambient
Temperature Control

In all climates the New "O.J.-30"—direct-on-line starter is the inevitable choice for absolutely dependable starting and running protection of 415 volt 3 phase squirrel cage motors from 1 to 10 h.p.

Features include:

- Automatic Ambient Temperature Correction by a specially designed Bi-metal operated Thermal Overload Relay.
- Readily interchangeable heaters, with adjustment of load for any heater provided for, to assure full rating range.
- Relay is provided with push button operated hand reset.
- Contactor is shaft operated, and includes effective arc chutes, and self-aligning long-life contacts.
- Operation is by push button at the starter, or at one or more remote stations.
- Unit is available to suit variations of voltage and frequency.



(Indoor Type)



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SWITCH GEAR

Made by:

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NEW ZEALAND: Carroll & Carroll, Auckland.

Contact your Electrical Merchant for Supplies

The **NILSEN INDUSTRIAL GROUP**

NEW TENDERS - Contd.

DEPARTMENT OF PUBLIC WORKS.

Diving Compressor, petrol driven, for Williamstown. May 23.

Fluorescent Light Units (20), two tube, industrial type, for Brunswick. May 23.

Fuel Hot Water Service, for Melbourne. May 30.

Hot Water Service, for Eaglehawk. May 30.

Oil Fuel Central Heating and Hot Water Service, for Armadale. May 23.

MELBOURNE HARBOUR TRUST.

C.I. Bollards (20). June 3.

Steam Driven Generator, 10 K.W. June 3.

MELBOURNE AND METROPOLITAN BOARD OF WORKS.

C.I. and Cast Steel Lids. May 23.

C.I. Seating Rings, for Concrete Manhole Covers. May 23.

Concrete Drainage Pipes. May 23.

Concrete Pipes and Pipe Fittings. May 23.

Concrete Covers, for Manholes and Inspection Shafts. May 23.

Propeller Fans (9), electrically driven, each with 7,800 C.F.M. cap., complete with ducts, flashing, etc. May 23.

Stoneware Pipes and Pipe Fittings, 4, 6, and 9 inch diameters. May 23.

POSTMASTER-GENERAL'S DEPARTMENT.

Parcel Hampers and Letter Clearance Baskets (Sch. V.348). May 30.

Tool Steel (Sch. V.351). June 6.

STATE ELECTRICITY COMMISSION.

Conveyor Belts, for Bucket Wheel Dredger and Overburden Spreader (Spec. 49-50/330). June 7.

Main Distribution Boards (400 V.), and Air Circuit Breakers (Spec. 49-50/296). Extended to June 14.

Steel Wheels and Tyres, for Drive Bogies (Spec. 49-50/231). May 24.

MISCELLANEOUS.

C.I. Asbestos Cement Pipes, for Municipality of Beaconsfield. June 9.

Items of Plant:—Diesel Power Grader, 10-12,000 lb.; Diesel Crawler Tractor, 43-52 h.p., fitted with overhead Loader; 5 Tyne Ripper; Low Loader Trailer, cap. 12 tons, for Shire of Burrangong. June 9.

R.C. Pipes, approx. 5,650 lin. ft. for Shire of Doncaster and Templestowe. May 22.

Traffic Control Lights, for City of Shepparton. May 29.

QUEENSLAND

MISCELLANEOUS.

Low Voltage Sub-station Equipment, for Townsville Regional Electricity Board. July 17.

Mild Steel Plate, 1,500 tons, for Townsville City Council. Extended to June 1.

STATE ELECTRICITY COMMISSION.

C.I. Pipes and Specials (Spec. 211). July 12.

Power House Switchboards (Spec. 195). Aug. 9.

WEST AUSTRALIA

GOVERNMENT TENDER BOARD.

Air Compressors, for State Saw Mills. May 25.

Air Compressors and Receivers, for Ejector Station. May 25.

Farm Equipment, Second-hand, Purchase of. May 25.

Floating Dredge Plant. June 22.

Fordson Grader, Purchase of. May 25.

Lubricating Oils, detergent type, for Railways. May 25.

Wall Tiles, for Midland Junction. May 25.

Ploughs, for Forests Department. May 25.

(Turn to page 81.)

OFFICE MACHINES AND OFFICE SYSTEMS

FACTORY JOB CLOCKS. Models for up to 16 to 20 employees. 48. 72. 96. 120. 144. 168. 192. ACCOUNTING AND BOOKKEEPING MACHINES. Types Statement and Ledger Sheet simultaneously accumulates Sales and Credit Totals, proves the whole and rounds up to 1000 statements at any time. Installing instructions given and necessary system prepared and printed.

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Specialities

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WOODWORKING MACHINERY

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Bell Sanders, Positive Foot
Mitring Machines, etc.

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Ceramic & Permeable
Cements

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Pty. Ltd.**

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SYDNEY

Telephone: M 2775

NEW TENDERS — Contd.

Pumping Machinery, for Vic. Park Pumping Station. June 1. Railway Wagon Tarpaulins. June 1. Steel Hospital Furniture. May 25.

CURRENT TENDERS

The following tenders have appeared in previous issues and are still current.

COMMONWEALTH

POSTMASTER-GENERAL'S DEPARTMENT.

Adhesive Insulating Tape (Sch. C.6247). May 7. Barretters (Sch. C.6293). July 11.

Carrier Telegraph Equipment (Sch. C.6288). July 20.

Communication System between Sydney and Melbourne (Spec. C.6157). Oct. 5.

Condensers (Sch. C.6292). July 20.

Electric Soldering Tools (Sch. C.6308). May 25.

Felt Hats and Helmets (Sch. C.6313). May 25.

Insulated Wire (Sch. C.6263). June 6.

Insulators (Sch. C.6302). May 25.

Magnetic Type Recorders (Sch. C.6303). July 27.

Maintenance Parts, for Long Line Equipment (Sch. C.6262). June 1.

Manhole Covers and Frames (Sch. C.6261). May 25.

Metalworking, Grinding and Cut-off Wheels (Sch. C.6286). June 6.

Morkrum Printer Parts (Sch. C.6285). July 20.

Motor Generators (Sch. C.6276). June 6.

Portable Tone Test Sets (Sch. C.6227). June 27.

Portable Water Pump Units (Sch. C.6307). May 30.

Post Office Scales and Weights (Sch. C.6284). July 18.

Printed Forms, Registration "R" Series (Sch. C.6312). May 25.

Relays, 3,000 type (Sch. C.6270). May 25.

Routine Testing Equipment (Sch. C.6281). July 25.

Spindles, Steel (Sch. C.6286). June 13.

Stay Rods (Sch. C.6306). May 30.

Testing Instruments (Insulating Resistances), (Sch. C.6289). July 13.

Tools, Leadworking, Measuring and Miscellaneous (Sch. C.6246). July 20.

Water Tank Trailers (Sch. C.6297). May 25.

Wire, G.I. Steel Stranded (Sch. C.6275). June 1.

GOVERNMENT RAILWAYS DEPARTMENT.

Diesel Powered Rail Cars (8ft. 6in. gauge). June 6.

(Turn to page 82.)

CHEMICAL SERVICE TO INDUSTRY

CHEMICALS SUPPLIED BY ICIANZ ARE BASIC RAW MATERIALS FOR INDUSTRY.

THE RESOURCES OF ICI ARE CONTINUALLY DIRECTED TOWARDS NEW CHEMICALS. WIDE KNOWLEDGE AND EXPERIENCE ARE APPLIED TO RESEARCH AND DEVELOPMENT.

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"ALLOPRENE": Chlorinated rubber product which is available in a number of grades, making a wide range of viscosities in film forming preparations achievable. "Alloprene" films are very resistant to corrosion by chemicals.

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SOLVENTS: A number of interesting solvents on our Developmental Range include Dimethylcyclohexanol and Tetrahydrofurfuryl alcohol. These are available in quantities sufficient for pilot plant studies.

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AGENTS: Elder, Smith & Co. Ltd., South Australia and Western Australia.
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SUN-1-X-607

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WON'T HURT IT!

MARINO FLEXIVANE PUMP

(Dowling Patent No. 18857/48)

This self-priming pump is unbeatable for engine cooling and bilge pumping and all small water pumping jobs. Capacity is 300 gals. per hour at 1,000 r.p.m. and no lubrication is necessary. Write for details.

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Max Germaine, 38 Collins Street, Hobart.

Manufactured by

MARINO PRODUCTS PTY. LTD.
BARRY PARADE, BRISBANE, QUEENSLAND



Don Spot Welders

Spot Welding Advantages:

- Replaces Riveting, Brazing and Soldering.
- Stronger than riveting — up to 100%.
- Quicker — no marking out, drilling or riveting.
- Cheaper — current consumption extremely low.
- Junior Labour can operate machines.
- Clean finish — no distortion of metal.

We also manufacture a standard type floor model with the following features:

Special electrode alloy for dissimilar metals.
Arms easily adjustable to any position.
Lower arm adjustable, giving deep span.
Water cooling right to tip of electrodes.
Pedal allows operation from any position.
Fine current control readily accessible.
Isolating switch and water cock provided.
Reserve power — Transformer amply rated.
Water circulation system visible to operator.

HEAVY AND SPECIAL TYPES AVAILABLE



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Stand as illustrated is extra if required

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SAMPSON BROS. PTY. LTD., 80 WILLIAM STREET, MELBOURNE
Queensland Agents:
ELECTRICAL AGENCIES, 193 ELIZABETH STREET, BRISBANE

CURRENT TENDERS—Contd.

DEPARTMENT OF CIVIL AVIATION.

Fire Trailer Units (Sch. 289). May 23.

Mild Steel (Sch. 287). May 30.

DEPARTMENT OF SUPPLY AND DEVELOPMENT.

Aluminium Alloy Cabin Trunks. May 30.

Ambulance Stretchers. May 23.
Power Saw Blades. Purchase of. May 23.

Fullover Jerseys. May 23.
Scrap Aircraft, Aero Engines and Miscellaneous Items, Purchase of. May 25.

DEPARTMENT OF WORKS AND HOUSING.

Air Conditioning Plant, for Incubation Room. May 23.

C.I. Pipes and Specials. May 23.

Compressed Air Plant Mechanical Ventilation Systems. May 23.

Constant Temperature Room Equipment. May 23.

Flush Cisterns (250), 3 gallon.

May 23.

Hand Wash Basins (250). May 23.

Radiation System. May 23.

Sump Pumps. May 23.

Coal Handling Equipment, for Lake Macquarie Power Station (Spec. 1263). July 5.

Concrete Pump, with 25 h.p., 415 volt, 3 phase electric motor (Sch. CE-1886). June 5.

Concrete Pump, with 25 h.p. Electric Motor (Sch. CE-1924). June 19.

Dust Collectors (5), for Ultimo Power Station (Spec. 1252). June 21.

Frequency Modulated Radio Apparatus (Spec. 83). May 31.

Platform Trucks, Battery Operated, 2 ton capacity (Sch. CE-1838). May 25.

(Turn to page 83.)

MANUFACTURERS

Do your products look as good as they are?
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If not—Let our artists design a colourful decoration with an arresting trade mark!

Then—Watch the sales curve rise!

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BRISBANE 8 4261
LAUNCESTON 1046

SYDNEY MA 2409
ADELAIDE CENT. 8434
PERTH 8 3650

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you
think
of

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549 CHURCH STREET
RICHMOND, E.1.
VICTORIA

NEW SOUTH WALES

GOVERNMENT RAILWAYS DEPARTMENT.

Carrier Telephone System (Spec.

84). May 31.

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COPPER Boat Nails, Copper Sheathing Nails, Copper Wire Tacks, Copper Ropes and Copper Clouts available for prompt delivery. Special sizes and types made to order. Detailed illustrated leaflet available on application.

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STEEL SPROCKET CHAIN

Formed from special steel strip, heat-treated under pyrometric control and tested for pitch and tensile strength.

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NEW TENDERS - Contd.

Power Press (15 ton), with removable die plates (Sch. CE-1889). June 5.

Powder Vans (12), four wheel, steel underframe (Spec. 2205). May 31.

Rectifier Units (4,000 KW) and Energy Dissipating Resistor Units (Spec. 1258). July 12.

Wheel Tyre Turning Lathes, for turning tyres when mounted on wheel sets (Sch. CE-1892). June 6.

DEPARTMENT OF MAIN ROADS.

Battery Chargers. June 1.

Membrane Sealing Compounds (200 gals.), for curing concrete. June 15.

Metalwork and Machinery, Oct. 5.

Screening Machinery, for Granville. July 11.

Structural Steelwork, for Granville. Extended to July 11.

Transceiver Sets, with Battery Charger. June 1.

METROPOLITAN WATER, SEWERAGE AND DRAINAGE BOARD.

C.L. Flanged Fittings (60 tons). May 23.

Centrifugal Type Pumping Units, (2), elect. driven, vertical spindle, for Homebush Sub-station. Extended to June 6.

Centrifugal Type Pumping Unit, electrically driven, for Brimstone Gully Coal Mine. June 27.

Combined Passenger and Goods Lift, elect. driven and controlled for Bondi Outfall Treatment Works. June 6.

Electrically driven Centrifugal Type Pumping Units (2), for Caringbah. June 27.

Pumping Unit, Electrically Driven, Centrifugal Type, for Kilara. Extended to June 6.

Pumping Units (2), Electrically Driven, Centrifugal Type, for Coledale. Extended to June 6.

Spare Parts for Pneumatic Rock Drills. May 20.

Vertical Spindle—Centrifugal Type Pumping Units (2), electrically driven, for Upper Cordeaux.

July 25.

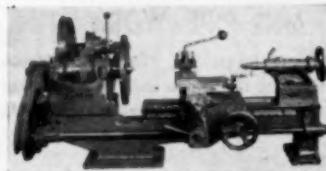


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SYDNEY COUNTY COUNCIL.

Air Break Isolating Switches, for Support Insulators (Spec. 1386). June 15.

Booster Regulators, for Low Voltage Distributors (Spec. 1384). June 8.

Coal Handling Plant, for Bunnerong "B" Power Station (Spec. 1400). Extended to June 15.

Compensators and Relays, for Voltage Regulating Equipment (Spec. 1407). June 22.

Current Limiting Reactor, oil immersed, for City Sub-station (Spec. 1348). May 25.

Light Fuel Oil. May 30.

Lightning Arresters. 122,000 volt. (Spec. 1385). May 25.

Metal Clad Switchgear (35,000 volt.), for Homebush Sub-station (Spec. 1403). Aug. 17.

Oil Circuit Breakers. 11,000 volt., 150 MVA Indoor cubicle type (Spec. 1411). June 8.

Oil Immersed Current Limiting Reactors for City Sub-station (Spec. 1348). May 25.

Power Transformers (15,000 K.V.A.), for Sub-stations (Spec. 1361). June 1.

Power Transformers (15,000 K.V.A.), for Sub-stations (Spec. 1384). Extended to June 8.

Single Conductor, Varnished Cambric Insulated Cable (11,000 volt.), (Spec. 1381). May 25.

Steel Economiser Tubes, solid drawn, for Section "B", Bunnerong Power Station (Spec. 1410). May 25.

MISCELLANEOUS.

Ammonia Condenser Coils, for Newcastle City Council. May 22.

Caravans (?), Semi-trailer Type, for Shire of Baulkham Hills. May 29.

Diesel Autopatrol Grader, tandem drive, with hydraulically operated controls, 12 ft. blade, Scraper, etc., for Shire of Stroud. May 22.

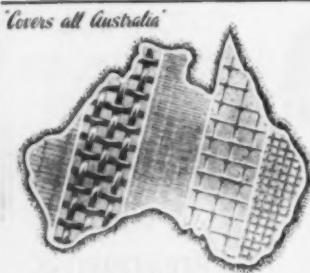
Duplicating Machine, Purchase of, from Shire of Baulkham Hills. May 22.

Electrically driven Pumping Plant, for effluent recirculation, for Tamworth City Council. May 30.

Front End Loader, for Shire of Windouran. May 30.

Hydraulic Regulating Valves (37), for Central Tablelands County Council. Extended to May 30.

(Turn to page 84.)



WOVEN Wire Gauze

of every description
manufactured in steel,
galvanised, brass,
copper, monel, tinned,
bronze, stainless steel,
silver.

For Mining Screens, Quarries, Harvesters, Grading Metal,
Barley, Malt, Flour, Petrol.

WIRE WORK OF EVERY DESCRIPTION

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purposes.

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142 QUEENSBERRY STREET, CARLTON, VICTORIA.

CURRENT TENDERS - Contd.

Mechanical Street Sweeper, for
Municipality of Drummoyne. May
29.

Pneumatic Tyred Mobile or
Crawler Track Type Machines, for
Shire of Tallangatta. June 2.

Road-making Equipment:—
Tractor, tracked type, up to 40
h.p., with angledozer attachment;
Water pump and engine, capable
of delivering 10,000 gallons per
hour at 10 ft. suction head; Emul-
sion Sprayer Trailer, with power-
operated pump and spray bar,
capacity 45 gallons; Bitumen
kettle trailer, 3 drum capacity,
with hand spray attachment;
Bitumen kettle and sprayer
trailer, 350 gallon capacity, with
spray bar and hand spray attach-
ment; Ripper, suitable for use with
25-40 h.p. tractor, for Shire of
Gundagai. May 20.

Sewer Separation Equipment, for
Wade Shire Council. May 30.

Speed Patrol Grader and Auto
Scythe, for Camden Municipal
Council. May 26.

Transformers (14), of various
sizes, for New England County
Council. May 20.

Truck Type Switchgear (11,000
v.), for Shire of Blacktown. July
4.

VICTORIA

GOVERNMENT RAILWAYS DEPARTMENT.

Common Battery Switchboard,
floor type. June 7.

Gullotine Shearing Machine.
May 31.

Letterpress Printing Machine,
quad crown, two revolution. May
24.

P.A.B.X. Equipment, Manual
Telephone Switchboard Power
Plant and Telephones. June 7.

Point Detection Relays. May
24.

Power Plant and Telephones.
June 7.

Switchboards and Telephones.
June 7.

CITY OF MELBOURNE.

O.H. Travelling Cranes, electric-
ally operated (2), 10 ton (Spec.
704/E). June 14.

Road Traffic Control Signals.
Extended to June 21.

Steel Shelving (Spec. 715/E).
June 19.

DEPARTMENT OF CIVIL AVIATION.

Altimeter Settings Indicators
(Sch. 292). June 20.

Carrier Telephone Equipment
(Sch. 295). June 20.

Radio and Electrical Test
Equipment (Sch. 294). June 27.

MELBOURNE AND METRO-
POLITAN BOARD OF
WORKS.

Concrete Production Plant. June
20.

Flat Tracing Paper (17 x 27
inches). 40 reams. June 20.

(Turn to page 85.)

ANTI-FRICTION WHITE METAL

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CURRENT TENDERS—Contd.

M.S. Elevated Tank (10,000 gall.), May 23.

Workshop Equipment—Milling Machine, Grinders, Lathe, Electric and Hydraulic Hoists, etc. May 23.

MELBOURNE HARBOUR TRUST.

Cast Steel Buckets (40). May 26.

Chain Wire Fencing and Gates. May 26.

Dredge Bucket Connecting Links (50). May 26.

Dredge Bucket Connecting Links (100). May 26.

Fibrous Plaster May 26.

Generating Set, Diesel Driven. May 26.

Mechanical Ventilation System. May 26.

POSTMASTER-GENERAL'S DEPARTMENT.

Barrier Stakes (Sch. V.341). May 23.

Mail Sorting and Stamping Tables (Sch. V.335). May 23.

Sorting Tables, for Postmen (Sch. V.347). May 23.

STATE ELECTRICITY COMMISSION.

belt Conveyor System (Spec. 50-51/4). Aug. 2.

Cement (Spec. 49-50/306). May 21.

Equipment of Centralised Control of Consumer Loading (Spec. 49-50/171). June 21.

Horizontal Centrifugal Pumps (Spec. 49-50/321). June 7.

Parallel Slide Valve, for Bed Steam (Spec. 49-50/318). May 24.

Switchgear (220,000 volt.) and Accessories (Spec. 49-50/251). Extended to July 26.

Telephone Cable (Spec. 49-50/291). July 12.

Telephone Cable Loading Coil Assemblies (Spec. 49-50/322). June 21.

Vulcanised Rubber Insulated Copper Cable (Spec. 49-50/316). May 24.

STATE RIVERS AND WATER SUPPLY COMMISSION.

Electric Pumping Units (4), motor-driven, for Bed Cliffs. June 20.

MISCELLANEOUS.

Plant:—Power Grader, medium; Speed Patrol or Light Power Grader, for Shire of Rochester. May 29.

Pumping Plant, engine-driven and Piping suit working head of 200 ft. for Town of Sale. May 20.

Steel Tram Line, 2 ft. gauge (Rails 25 lb. per yard). Purchase of, from Shire of Alexandra. June 14.

Water Filtration and Purification Plant:—Flocculating and Sludge Scraping Mechanisms; Filter Control Valves; Rate Controllers, Indicators, and Connecting Pipework; C.I. Pipes and Fittings, for Treatment Plant Units;

Chemical Dry Feeders, etc.; Solution Mixing Equipment, Chlorinating Equipment, etc., for Mildura Urban Water Trust. July 10.

Water Purification Plant:—Flocculating and Sludge Scraping Mechanism; Filter Control Valves; Filter Rate Controllers, etc.; Cast Iron Pipes and Fittings; Supply of Chemical Dry Feeders, for Shepparton Urban Water Works Trust. June 21.

QUEENSLAND

BRISBANE CITY COUNCIL. Cable, 33,000 volt., and Pilot Cable. June 9.

GOVERNMENT RAILWAYS DEPARTMENT. Diesel Electric Locomotives (10). June 30.

(Turn to page 86.)

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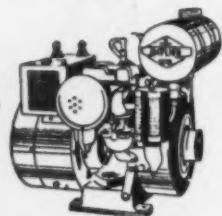
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CURRENT TENDERS—Contd.

STATE ELECTRICITY COMMISSION.

Alternator, 64 KV, 125 KW (Spec. 194). July 19.

C.I. Pipes and Specials, C.I. Twin Strainers and C.I. Gate Valves, for Air and Oil Cooler Circulating Water (Spec. 212). June 21.

Centrifugal Pumps (Spec. 217). May 24.

Fire Protection Equipment (Spec. 173). May 24.

Generating Plant, gas-cum, oil engine driven, for Charleville (Spec. 208). June 7.

Power House Switchgear, low tension (Spec. 203). June 21.

Steam and Water Valves, high and low pressure (Spec. 193). May 24.

Steam and Feed Water Valves for Boilers, Wide Bay Regional Electricity Commission (Spec. 195). Ext. to June 21.

Steam Turbo Alternators (Spec. 200). Aug. 30.

Steam Turbo Alternator (Spec. 196). Aug. 16.

Water Tube Boilers (Spec. 200). Aug. 30.

Wood-burning Gas Producer Plants (Spec. 192). May 31.

STATE STORES BOARD.
Galvanising Iron. May 22.

MISCELLANEOUS.

Distribution Transformers, 8-Phase. Extended to May 26.

Equipment—Electric Generating Set, portable; Earth Boring Machine; Portable Power Driven Saw, for Townsville Regional Electricity Board. June 5.

SOUTH AUSTRALIA

SUPPLY AND TENDER BOARD.

Carrier Telephone System. June 19.

Marine Diesel Engine, 30 h.p. May 22.

WEST AUSTRALIA

GOVERNMENT TENDER BOARD.

Cotton Waste, 100 tons, for Railways. June 15.

Diesel Mechanical Locomotives (18). July 20.

Diesel Electric Main Line Locomotives (48). July 27.

Fire Fighting Hose, for Forests Department. June 1.

Mild Steel Plate, 1. 2/16 and 9/16 inch. May 25.

Pumps—G.W.S. Norseman, Extension. May 25.

NEW ZEALAND

HYDRO ELECTRIC DEPARTMENT.
Electric O.H. Travelling Cranes (2), 4' motor, 80 ton. May 20.

(Turn to page 27.)

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Underhill, Day & Co. Pty. Ltd., Adelaide St., Brisbane.

South Australia: Plant Equipment Co. Ltd., 18 Hanson St., Adelaide.

CURRENT TENDERS—Contd.

Outdoor Switchgear, 110 k.v.

June 6.

Transformer Banks, 27,777 k.v.a.

(4), and spare unit. June 13.

Accepted Tenders

VICTORIA

GOVERNMENT RAILWAYS DEPARTMENT.

Cloth Overcoats (Sch. 212). John Cohen & Co. Pty. Ltd. Rates.

Uniform Caps (Sch. 213). Commonwealth Government Clothing Factory. Rates.

Office Chairs (Sch. 218). Bendifx Industries Pty. Ltd. Rates.

Pole Transformers (Con. 57,996). Wilson Electric Transformers Co. Pty. Ltd. Rates.

Insulated Copper Wire, 7/044 (Con. 58,178). Lawrence & Hanson Elec. (Vic.) Pty. Ltd. Rates.

Purchase and removal of Non-ferrous Scrap Metal. Extruded Metals Pty. Ltd. L. & M. Newman, D. McFarlane Pty. Ltd., Austral Bronze Co. Pty. Ltd., Albert G. Sims Ltd., M. B. John Ltd., Ingot Metals Ltd., The Moreland Metal Co. Pty. Ltd. Rates.

Carbon Brushes (Con. 7629). The Morgan Crucible Co. (A.) Pty. Ltd., 1/3 each, plus 20%.

Mains Connection Box (Con. 7628). Edmunds Bros. Pty. Ltd. 37/1 per dos. (2) 51/4 per doz.

Air Compressor (Con. 7648). Ingersoll-Rand (Aust.) Pty. Ltd. f1,417 each.

Dust Exhausters (Con. 7639). McPhersons Ltd. f82 each.

Public Address Systems. Amalgamated Wireless (A/asia) Pty. Ltd. f47/8/4, f88/18/5, f24/8/8, f90/16/-, f51/9/-, and f95/16/-.

Cleaning Cloths (Con. 7618). C. & S. Industrial Textiles Pty. Ltd. 5/111 lb.

Bearing and Cylinder Oils (Sch. 180). Caltex Oil (Aust.) Pty. Ltd., Vacuum Oil Co. Pty. Ltd. Rates.

Earthenware Lavatory Pans (Sch. 191). The Hoffman Brick & Pottery Ltd., R. Fowler Ltd. Rates.

Copper Boilers, Stoves, etc. (Sch. 195). A. H. Ryan & Irving Pty. Ltd., Galliers & Klaerr Pty. Ltd. Rates.

Spring Steel Washers (Sch. 207). F.R.S. Ideal Spring Co. Ltd., Central Spring Works, Henderson's Federal Spring Works Ltd. Rates.

Traction Motor Carbon Brushes (Con. 58,185). The Morgan Crucible Co. (Aust.) Pty. Ltd. Rates.

Electric Saws. E. A. Machin & Pty. Ltd. (1), f64/12/-, less 10%.

Electric Hand Drills: (2). A. H. Gibson (Elec.) Pty. Ltd., f9/5/-, less 10%.

(Turn to page 88.)

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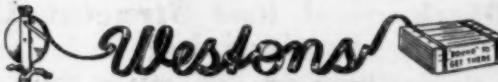
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Pty. Ltd.; item 2, £117. Stewarts & Lloyds (Aust.) Pty. Ltd.

Generating units, a.c., item 1A, £2,615; item 1B, £2,648; item 1C, £3,144; item 1D, £5,785; item 1E, £177. Harris, Scarfe & Sandovers Ltd.

Heaters, for Maldon. A. Cox, £112.

Hot Water System. R. S. Patman, £78.

Fittings, for Prefabricated Schools. F. T. Pulling, £11,780.

Equipment, for Parliament House. McKenzie & Ogden, £75.

Equipment, for Emily McPherson College of Domestic Economy. Automatic Heating Appliances Pty. Ltd., £606/14/-.

Equipment, for Mental Hospital at Kew. Charles E. Guy & Co., £250.

Fittings, for Teachers' College. Mason & Taylor, £145.

Heater. Midoco Pty. Ltd., £33/5/-.

Window Fittings. National Theatre Supplies, £27/18/6.

Fitting to Lift. Johns & Waygood Ltd., £34/16/-.

Equipment for Mental Hospital. J. Walsh, £20.

Fly-wire Screens, for Essendon Police Station. J. J. Lynch, £72/17/-.

Water meters; item 1, £4/17/8 ea.; item 2, £5/17/6 ea.; item 3, £8/17/6 ea. The Dobbie Dico Meter Co. (W.A.) Ltd.

Fabrication of pipes, from plates supplied, item 1, 3/10 per ft.; item 2A, 4/9 per ft. Hume Steel Ltd.

Brass boats, complete, two, £18/10/-, S. W. Hart & Co.

Flanging press, hydraulic, up-stroking, £17,102 stg. Flower, Davies and Johnston.

Refrigerators, two, item 1, £254; item 2, £164. A. J. Baker & Sons.

Arc welding, "S. & L." T.A.D. 4, with sheet metal controller, £216. Stewarts and Lloyds.

Diorite screenings, 1 in., 450 tons, £1 9/3 per ton. Mountain Quarries Ltd.

Blood receiver, 500 gal. £105. Saunders & Stuart Pty. Ltd.

Special pipes, bends, etc., £1,256. State Engineering Works.

(Turn to page 89.)

SOUTH AUSTRALIA

STATE STORES BOARD.

Sheet steel piling. Larssen, £23,360 stg. James F. Rogerson.

WEST AUSTRALIA

GOVERNMENT TENDER BOARD.

Mach. for State Saw Mills, item 2, £230. Atkins (W.A.) Ltd.; item 3, £191. Southern Cross Windmill and Engine Co. Ltd.; item 4, £335. George Moss Pty. Ltd.; item 5, £220. Malloch Bros. Ltd.

Milling Mach., Archdale, 34 in. vertical, £1,730 stg. Alfred Herbert.

Machine tools and equip.; item 1, £2,265. Brown & Dureau Ltd.; item 2, £468. McPherson's Ltd.; item 3, £1,291. Gilbert Lodge & Co.; item 4, £349. Lincoln Electrical Co.

Arc welding plants, item 1, £350. Wesfarmers, Tutt, Bryant

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Accepted Tenders—Continued

Water meters, item 1, £4/14/- ea.; item 2, £5/15/- ea. Dobbie Dico Meter Company (W.A.) Ltd.

X-ray units, "Standard" 85/90 standard model, two, £380. S. Van Dal & Co.; unit, 4kW, £35; k kW, £102. Watson, Victor Ltd.

Vertical Singlex feed pumps, "Hosco-Carruthers", £324. Hoskin Engineering & Foundry Ltd.

Stoneware pipes and specials, rates on application. H. L. Brisbane & Wunderlich Ltd.

Abney levels "Watts" B618, 5 in., six, £12/10/- ea. C. H. MacKenzie & Co.

Windmill, "Alston", double-gear, self-rolling, on 30 ft., 4 post galv. steel tower, £157. Malloch Bros. Ltd.

Plate, m.s., 1,000 tons, Siemens Martin quality, 72 in. wide x 1 in. £37 per ton. Overseas Corporation (Aust.) Ltd.

Diorite screenings, 1 in., 1 in. and 1 in., rates tendered. White Rock Quarries.

Porcelain pedestal pans, 1,000, £2/14/3 ea. McLean Bros. & Rigg. Engine bearing oil, Shell 504, 34,000 gals., 4.9 per gal. The Shell Co. of Australia Ltd.

Machine tools, item 1, £115; item 3, £192; item 10, £1,066. McPherson's Ltd.; item 2, £1,425. Gilbert Lodge & Co. Ltd.; item 4, £655; item 9, £2,025. Flower, Davies & Johnson Ltd.; item 6, £73. J. J. Masur & Co.; item 11, £38/15/-. McLean Bros. & Rigg.

Lubricating oils for locomotives, item 1, 4/9 gal.; item 2, 4/4 per gal.; item 3, 4/1 per gal. Shell Co. of Aust. Ltd.; item 4, 3/4 per gal. Vacuum Oil Co. Pty. Ltd.

Elec. motors for State Battery, Kalgoorlie, £25/3/- ea. British General Electric Co. Pty. Ltd.

Alternator Set and Auto. Voltage Regulator, item 1, £1,145; item 2, £120. Harris, Scarfe & Sandovers.

Diesel Engine, Marine, "Gardner", £1,746. Diesel Motor Company.

Stainless Steel Fittings, item 1, £26; item 2, £70. H. L. Brisbane & Wunderlich Ltd.

Hydraulic Hoist and Air Compressor Units, item 1, £120. Atkins (W.A.) Ltd.; item 2, £151. Wm. Adams.

"Shield Arc" Welders, "Lincoln", Type S-7061, d.c., four, £380 ea. The Lincoln Electric Co. (Aust.) Pty. Ltd.

Plant for Main Roads item 4, £113. McPherson's Ltd.; item 5, £792. Lincoln Electric Co.; item 6A, £80 ea.; item 7, £65 ea. George Morris Pty. Ltd.; item 9, £93. William Adams; item 10, £50. Malloch Bros.

Floor Polishers, Elec. "Hi Speed", eight, £49/6/3 ea. Atkins (W.A.) Ltd.

Motorised Valves and Thermostats, item 1, £43 ea.; item 2, £4/18/6 ea. Harris, Scarfe & Sandovers.

Portland Cement, "Tunnel" Brand, 10,000 tons, £8/8/6 stg. per ton. Elder, Smith.

Late Open Tenders

NEW SOUTH WALES

GOVERNMENT RAILWAYS DEPARTMENT.

Leather Goods (Sch. 40). May 31.

Radial Girder Drilling Machines (12), 8 ft. max. rad. of spindle. May 31.

Transformers (4), 2,000 KVA, £33,000/2,200-volt. (Spec. 1265). June 28.

METROPOLITAN WATER, SEWERAGE AND DRAINAGE BOARD.

Concrete Mixing and Batching Plants (2 or 3), approx. capacity 20 cu. yds. per hour. June 27.

SYDNEY COUNTY COUNCIL.

Storage Battery and Battery Charging Equipment, for City North Sub-station (Spec. 1409). June 22.

Voltage Cables, high and medium, for Bunnerong Power Station (Spec. 1415). June 29.

MISCELLANEOUS.

Auto. Patrol Grader, Powered by 4 Cylinder Diesel Engine of 50 h.p., weight approx. 16,000 lb. Purchase of, from Newcastle City Council. May 26.

Diesel Road Boiler, 10-12 tons weight, Purchase of, from Cumnahurst Shire Council. June 19.

Road Grader, Medium, Diesel Operated, for Municipality of Barra. June 12.

Road Making Machinery—Motor Grader, with Diesel Engine, approx. 10 tons; Motor Grader, with Kerosene Engine, approx. 5 tons, Purchase of, from Shire of Jemalong. May 29.

VICTORIA

GOVERNMENT RAILWAYS DEPARTMENT.

All Geared Head, S.S.S. Lathes (12-17 inch swing). June 21.

Insulated Copper Wire. June 21. Insulators and Air Break Switches. June 21.

Steel Tool Lockers. May 24. Supervisory Control Equipment, Control Desk Key Panels and Diagram Panels. Aug. 9. Telephone Cable. June 7.

QUEENSLAND

MISCELLANEOUS.

Cable End Sealing Boxes and Overground Disconnecting Boxes, for Townsville Regional Electricity Board.

Diesel Crawler Tractor, approx. 50 d.b.h.p., with End Loader Shovel, for Duaringa Shire Council. May 31.

Pumps and Motors, for Chinchilla Shire Council. June 12.



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DEPARTMENT OF RAILWAYS—
NEW SOUTH WALES.

TENDERS enclosed in sealed envelopes which must be endorsed "TENDER FOR . . ." addressed to the Commissioner for Railways, 19 York Street, Sydney, will be received on the dates and times shown for services specified. Tenders may be lodged in the Tender Box, Room 504A, 5th Floor, Railway House, 19 York Street, Sydney, or posted to the above address.

Wednesday, 31st May—

12 noon.

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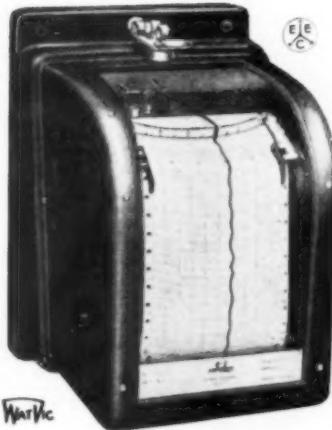
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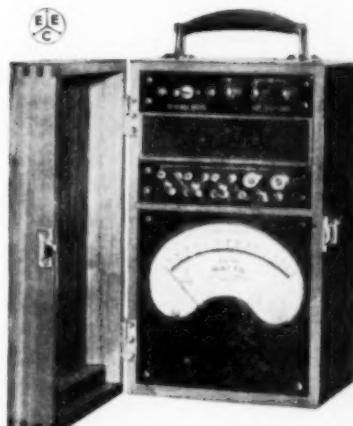
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